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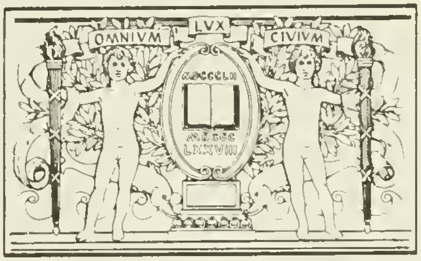

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NORTH STATION URBAN RENEWAL PROJECT

FINAL ENVIRONMENTAL IMPACT REPORT / ENVIRONMENTAL IMPACT STATEMENT

EOEA NO. 03728
HUD-ROI-EIS-83-01-F

BOSTON REDEVELOPMENT AUTHORITY

NOVEMBER 30, 1983

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NORTH STATION URBAN RENEWAL PROJECT

Final Environmental Impact Report/ Environmental Impact Statement

Prepared pursuant to Massachusetts General Laws, Ch., 30, Sec. 62A

(EOEA #03728)

and the National Environmental Policy Act of 1969 (P.L. 91-190), as amended

(HUD-R01-EIS-83-01-F)
Section 104 (f)

BOSTON REDEVELOPMENT AUTHORITY

Boston, Massachusetts

November 30, 1983

NORTH STATION URBAN RENEWAL PROJECT

Boston, Massachusetts (Suffolk County)

FINAL ENVIRONMENTAL IMPACT REPORT/
ENVIRONMENTAL IMPACT STATEMENT

EOEA No. 03728
HUD-R01-EIS-83-01-F

Responsible Agency:

Boston Redevelopment Authority/City of Boston (acting for the U.S. Department of Housing and Urban Development pursuant to Section 104(f) of Title I of the Housing and Community Development Act of 1974, as amended).

Cooperating Agency

Urban Mass Transportation Administration

Contact for Further Information:

Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
Boston City Hall
Boston, MA 02201
(617) 722-4300

Type and Title of Proposed Action:

Administrative: Approval of an Urban Renewal Plan pursuant to Chapter 121B of the Massachusetts General Laws/Approval of a Community Development Block Grant loan guarantee pursuant to Section 108 of Title I of the Housing and Community Development Act of 1974, as amended.

Abstract:

This document addresses the environmental impacts of implementing a renewal plan to transform a blighted and underutilized section of Downtown Boston into a major mixed-use development to include a new sports arena, a new Federal Office Building, additional private office and commercial activity, structural parking for 3,700 cars, an innovative riverfront development through creation of an island for 1,100 residential units, and extensive transportation improvements. The principal impacts and benefits identified include increased levels of traffic generation, water quality improvements, potential hydrological effects from the construction of the mid-river island, improved public access to the riverfront, increased energy and water consumption and waste generation, and potential development conflicts.

Date of Availability to Public and Due Date for Comments:

Draft: June 30, 1982
Final: November 30, 1983

EIR comments due under MEPA on: January 6, 1984
EIS comments due under CEQ regulations on: January 9, 1984

City of Boston

Kevin H. White, Mayor

Boston Redevelopment Authority

Robert J. Ryan, Director

Robert L. Farrell, Chairman
Joseph J. Walsh, Vice-Chairman
James K. Flaherty, Treasurer
Clarence Jones, Member
William A. McDermott, Jr., Member
Kane Simonian, Secretary

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INTRODUCTION

This Final Environmental Impact Report/Environmental Impact Statement has been prepared pursuant to the Massachusetts Environmental Policy Act (General Laws, Chapter 30, Sections 62 to 62H, inclusive), Section 102(2)(c) of the National Environmental Policy Act of 1969 (P.L. 91-190), as amended, and Section 104(f) of Title I of the Housing and Community Development Act of 1974 (P.L. 93-383), as amended, to identify and evaluate the impacts of proposed redevelopment in the North Station area of the City of Boston and to provide a basis for selecting the most appropriate course of action among several alternatives. This document has been completed in accordance with the requirements of the implementing regulations of the Massachusetts Executive Office of Environmental Affairs (301 CMR 10.00 et seq.), the regulations of the Council on Environmental Quality (40 CFR Parts 1500-1508), and the regulations of the U.S. Department of Housing and Urban Development (24 CFR Part 58) respecting environmental review responsibilities for projects funded under Title I.

In compliance with the Massachusetts environmental regulations, a consultation and scoping session for the project was held on April 24, 1980. On May 14, 1980, the Secretary of Environmental Affairs issued a "Determination of Scope, Specific Procedure and Alternatives" for an Environmental Impact Report (EIR), which was modified on August 4, 1980. At the same time, the North Station urban renewal project was designated by the Secretary as a "major and complicated project" pursuant to M.G.L. Chapter 30, Section 62A, and a special procedure for the evaluation and review of the project was established. A copy of the determination and the scope of the EIR is included in Part I of this Impact Report/Statement.

In accordance with this special procedure and scope, an Interim EIR was prepared and was submitted to the Secretary of Environmental Affairs on August 28, 1980, for public review and comment, and on October 23, 1980, the Secretary issued a statement that this Interim EIR demonstrated to the satisfaction of the Secretary, pursuant to M.G.L. Chapter 30, Section 62F, that the North Station urban renewal project "may be carried out on the proposed land with appropriate constraints as may be necessary to minimize and prevent damage to the environment."

Subsequent to the preparation of the Interim EIR, the City of Boston determined that it would require Federal financial aid under Section 108 of Title I of the Housing and Community Development Act in order to assist in the implementation of the North Station project. Section 104(f) of Title I delegates HUD's environmental review and decision-making responsibilities to the Title I funding applicant - in this instance, the City of Boston. Since the City, through its Redevelopment Authority, has and will have substantial involvement in the planning of the project and in the implementation of redevelopment proposals, it was proposed that the City assume lead agency responsibility for the preparation of the Federal EIS and that the other Federal agencies involved in specific aspects of the redevelopment plan be designated as cooperating agencies, in accordance with 40 CFR Parts 1501.5 and 1501.6. Accordingly, on July 16, 1981, a consultation meeting was held between the City and representatives of the General Services Administration, Urban Mass Transportation Administration, Environmental Protection Agency, and Department of the Interior (the Department of Housing and Urban Development and the U.S. Army Corps of

Engineers declined to participate as cooperating agencies at this time prior to the meeting and the Federal Highway Administration, also invited, did not respond). As a result of this consultation, the City's assumption of lead agency role was accepted but only UMTA agreed to participate formally as a cooperating agency, the others agreeing to cooperate informally (for documentation, see Part I).

Moreover, since the project had undergone a previous scoping, it was administratively determined that the subsequent Federal involvement in the project did not warrant an additional scoping pursuant to 40 CFR Part 1501.7 and 24 CFR Part 58.17(c)(3). Notwithstanding, the scope for this Draft EIR/EIS has been expanded to comply with additional Federal EIS requirements contained in 40 CFR Part 1502.16, as supplemented by HUD-399-CPD, Environmental Reviews at the Community Level. This scope also was reviewed and agreed to at the Federal consultation meeting.

It should be noted in addition that the redevelopment of the North Station area is expected to occur in two phases - Phase I within the next 5-7 years and Phase II in approximately 8-15 years. At this time, the Phase II development is primarily conceptual. Therefore, in accordance with the MEPA scope, this Final EIR/EIS contains a detailed examination of the impacts of Phase I of the renewal project and a generalized examination of the Phase II impacts. A supplemental EIR/EIS will be submitted on the Phase II development plan when the proposals are more specifically defined. This procedure also was accepted at the July 16th Federal agency consultation meeting.

In accordance with the special environmental review procedures established for this project by MEPA, environmental impact reports or statements prepared by other Federal or State agencies for actions within the project area may be reviewed as part of this major and complicated project. On July 9, 1980, the U.S. General Services Administration published a Final EIS on the proposed new Federal Office Building in Boston, to be located in the North Station project area, and submitted a copy to EOEA for review under these procedures. Accordingly, this document is incorporated by reference into this Final EIR/EIS and is made a part thereof.* Similarly, the Urban Mass Transportation Administration and the Massachusetts Bay Transportation Authority have prepared a Draft EIR/EIS on the relocation of the Green Line rapid transit facilities in the North Station area, which document also has been reviewed as part of the environmental review for this redevelopment project.**

---

* General Services Administration, Public Buildings Service, Region I, Final Environmental Impact Statement - Proposed New Federal Office Building, Boston, Suffolk County, Massachusetts, Statement Number: EMA 78002, Boston, July 9, 1980.

** U.S. Department of Transportation/Urban Mass Transportation Administration, Draft Environmental Impact Statement - Boston Green Line at North Station: Alternative Improvements, August, 1982.

Finally, the General Services Administration's EIS on the proposed new Federal Office Building also was adopted by the City, under alternate NEPA procedures and conditions approved by the Council on Environmental Quality, to facilitate the release of HUD Section 108 funds to initiate project activities related to the new building (for documentation, see Part I). These activities commenced in March of 1982 with property acquisition and relocation, followed by demolition of the vacated structures, site preparation, utility relocations, and abandonment of streets within the development site. Construction of the Federal Office Building began in August 1983.

Part I MASSACHUSETTS ENVIRONMENTAL NOTIFICATION FORM AND SCOPE OF EIR/ FEDERAL CONSULTATION AND EIS ADOPTION DOCUMENTATION

MASSACHUSETTS ENVIRONMENTAL NOTIFICATION FORM and EIR SCOPING DOCUMENTATION

APPENDIX A
COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

ENVIRONMENTAL NOTIFICATION FORM

Do not write in this space

I. SUMMARY

A. Project Identification
1. Project Name North Station Urban Renewal Project
2. Project Proponent Boston Redevelopment Authority
Address One City Hall Square
Boston, MA 02201

B. Project Description: (City/Town(s) Boston
1. Location within city/town or street address North Station Area (see narrative summary for boundaries)
2. Est. Commencement Date: 1980 Est. Completion Date: 1995
Approx. Cost $ 600 million Current Status of Project Design: 0 % Complete

C. Narrative Summary of Project
Describe project and give a description of the general project boundaries and the present use of the project area. (If necessary, use back of this page to complete summary).

The proposed project involves the redevelopment of the last major undeveloped section in Downtown Boston. Lying between Leverett Circle and the new Charles River Dam, the project area encompasses approximately 58 acres of land and water and is bounded generally by Causeway Street, Lomasney Way, Martha Road, the old Charles River Dam, the Charles River, and Haverhill Street extended. The site contains a mixture of commercial, residential, office, institutional, and entertainment uses, but the majority of the area is given over to transportation related uses (railroad tracks, surface parking lots, the Green Line elevated tracks, local streets and expressway connector ramps). Major landmarks include North Station and Boston Garden, the Registry Building and the Mass. Rehabilitation Hospital.

The proposed Urban Renewal Plan will outline a development strategy for the North Station area. Combining public and private investment opportunities, the Plan will entail extensive transportation improvements, increased commercial and retail activity, and a more innovative riverfront development, principally through the creation of an island in the Charles River for over 1,000 new housing units. A major catalyst for the redevelopment of North Station would be the location of the proposed GSA Federal Office Building in the area.

Copies of this may be obtained from:
Name: Richard B. Mertens Firm/Agency: Boston Redevelopment Authority
Address: One City Hall Square, Boston, MA 02201 Phone No. 722-4300, ext. 388

379

THIS IS AN IMPORTANT NOTICE. COMMENT PERIOD IS LIMITED.
For Information, call (617) 727-5830

Use This Page to Complete Narrative, if necessary.

The development plan is proposed to be implemented in three phases over a 15-year period. Private investment is estimated at $400,000,00 with the remainder coming from a variety of City, State and Federal funding sources. The public initiatives include the following proposed actions:

Immediate (1-3 years)

- Green Line structure on Causeway Street removed and replacement service provided (30 months)

- Lomasney Way - Merrimac Street widened from Leverett Circle to Government Center Garage (24-36 months)

- Billerica Street blocks cleared and prepared for development (36 mos

- Commuter Rail Station improved including possible extension of the tracks and connections to the Green and Orange Line (36 months)

(cont. on page 2a)

This project is one which is categorically included and therefore automatically requires preparation of an Environmental Impact Report : YES X NO ______

D. Scoping (Complete Sections II and III first, before completing this section.)

1. Check those areas which would be important to examine in the event that an EIR is required for this project. This information is important so that significant areas of concern can be identified as early as possible, in order to expedite analysis and review.

	Construction Impacts	Long Term Impacts		Construction Impacts	Long Term Impacts
Open Space & Recreation		X	Mineral Resources		
Historical		X	Energy Use		X
Archaeological			Water Supply & Use		X
Fisheries & Wildlife			Water Pollution	X	X
Vegetation, Trees			Air Pollution	X	X
Other Biological Systems			Noise	X	X
Inland Wetlands			Traffic	X	X
Coastal Wetlands or Beaches			Solid Waste	X	X
Flood Hazard Areas			Aesthetics		X
Chemicals, Hazardous Substances, High Risk Operations			Wind and Shadow		X
Geologically Unstable Areas			Growth Impacts		X
Agricultural Land			Community/Housing and the Built Environment		X
Other (Specify)					

2. List the alternatives which you would consider to be feasible in the event an EIR is required.

No project

Alternative development strategy/designs, including alternative treatment of the river s edge, alternative land use/circulation relationships, alternative corridors for the permanent relocation of the Green Line, and various roadway/Expressway connection configurations.

Short Term (4-7 years):

- Nashua Street closed to arterial traffic; service only for buses, hospital traffic, and for Garden events (4 years)
- Permanent relocation of the Green Line to Lechmere (4-7 years)

Long Term (8-15 years)

- Northbound Storrow Connector relocated under the Charles to connect with I95/93 (8-10 years)
- Southbound Storrow Connector to the elevated artery is rebuilt either on grade or via tunnel (10-12 years)
- The existing Storrow Connector is removed, either totally or in part depending upon the completion of new Southbound Connector (8-12 years)
- The Central section of the Artery is either refurbished with minor alterations or reconstructed under grade (12-15 plus years)
- The rail lines are relocated on grade or depressed as part of the major artery reconstruction.

Assuming the above actions can be completed, the following reuse plan currently is proposed:

North Station - Garden Complex/ Billerica Street:

- A new focus for pedestrians is created on the north side of the Garden building, combining the train, transit and Garden activities. Major office and commercial uses, totalling 1,400,000 s.f., surround a central space, thus establishing a Rockefeller Center-type of open space; 1,500 garaged parking spaces replace existing surface lots.

River Area:

- New residential, park, and hotel uses are envisioned on the area comprising the rail yards and the river's edge. An island containing 1,100 dwelling units is created in the Charles, as well as a new waterfront promenade fronted by shops and a 400-room hotel. This pedestrian way connects the Esplanade park system, Canal Street and the proposed Freedom Trail Spur to Charlestown.

At the present time, a specific development plan has been established only for the North Station section of the proposed renewal area (the area bounded by Causeway Street, Lomasney Way, the Storrow Drive connector ramp, and Haverhill Street extended. Included in this development plan are a site for the Federal Office Building and the rehabilitation of North Station and the Boston Garden complex. For the remainder of the renewal area, the development plan is only conceptual at this stage and will further be defined through extensive planning and design studies to be carried out over the next several years.

E. Has this project been filed with EOEA before? Yes _____ No X
If Yes. EOEA No. __________ EOEA Action? __________

F. Does this project fall under the jurisdiction of NEPA? Yes X* No _____
If Yes, which Federal Agency? GSA/FHWA/UMTA NEPA Status? No determination as
* Component development proposals, such as Federal Office Building, highw
Green Line Relocations

G. List the State or Federal agencies from which permits will be sought:

Agency Name	Type of Permit
Department of Community Affairs	Chapter 121B Approval
Boston Conservation Commission	Chapter 131, s. 40 Order of C
EOEA - Division of Waterways	Chapter 91 License
EOEA - Division of Water Pollut. Control	Water quality certification
DEQE - Division of Air Quality Control	SIP consistency determination; emission permits
Metropolitan District commission	Sewer tie-in permit
U. S. Army Corps of Engineers	Section 10 and Section 404 per

H. Will an Order of Conditions be required under the provisions of the Wetlands Protection Act (Chap. 131. Section 40)?
Yes X No _____
DEQE File No., if applicable: __________

I. List the agencies from which the proponent will seek financial assistance for this project:

Agency Name	Funding Amount
Department of Housing and Urban Dev.(UDAG)	Not yet determined
Federal Highway Administr./Mass DPW	+ $6,000,000
Urban Mass Transportation Adm.	Not yet determined
Economic Development Adm.	Not yet determined
Department of the Interior	Not yet determined
Metropolitan District Commission	Not yet determined

II. PROJECT DESCRIPTION

A. Include an original 8½x11 inch or larger section of the most recent U.S.G.S. 1:24,000 scale topographic map with the project area location and boundaries clearly shown. Include multiple maps if necessary for large projects. Include other maps, diagrams or aerial photos if the project cannot be clearly shown at U.S.G.S. scale. If available, attach a plan sketch of the proposed project.

B. State total area of project: 58.2 acres
Estimate the number of acres (to the nearest 1/10 acre) directly affected that are currently:

1. Developed .... 46.1 acres
2. Open Space/Woodlands/Recreation ____ acres
3. Wetlands .... ____ acres
4. Floodplain .... ____ acres
5. Coastal Area .... ____ acres
6. Productive Resources
   - Agriculture .... ____ acres
   - Forestry .... ____ acres
   - Mineral Products .... ____ acres
7. Water 12.1 acr

C. Provide the following dimensions, if applicable:
Length in miles NA Number of Housing Units 1,000-1,200 Number of Stories 10-20

	Existing	Immediate Increase Due to Project
Number of Parking Spaces	2,200	1,500
Vehicle Trips to Project Site	5-8,000	9,400
Estimated Vehicle Trips past project site	211,500	261,000

D. If the proposed project will require any permit for access to local or state highways, please attach a sketch showing the location of the proposed driveway(s) in relation to the highway and to the general development plan; identifying all local and state highways abutting the development ; and indicating the number of lanes, pavement width, median strips and adjacent driveways on each abutting highway. and indicating the distance to the nearest intersection.

ASSESSMENT OF POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS

Instructions: Consider direct and indirect adverse impacts, including those arising from general construction and operations. For every answer explain why significant adverse impact is considered likely or unlikely to result.

Also, state the source of information or other basis for the answers supplied. If the source of the information, in part or in full, is not listed in the ENF, the preparing officer will be assumed to be the source of the information. Such environmental information should be acquired at least in part by field inspection.

A. Open Space and Recreation

1. Might the project affect the condition, use or access to any open space and/or recreation area?

Yes ______ No __X__

Explanation and Source:

There are no public open spaces or recreation areas within the proposed urban renewal area. However, the plan does call for extending the Charles River Park system along the river's edge with a promenade for pedestrians and bicyclists and provides for public access to the river's edge.

B. Historic Resources

1. Might any site or structure of historic significance be affected by the project? Yes __X__ No ______

Explanation and Source: The only identified historic resource within the project area is the old Charles River Dam and Green Line bridge over the Charles River, which are included in the Charles River Basin National Register district. The Massachusetts Historical Commission has surveyed the area and not identified any other site or structure of historical significance.

Source: Massachusetts Historical Commission

2. Might any archaeological site be affected by the project? Yes ______ No __X__

Explanation and Source:

Since the project area is almost entirely filled land, no potential archaeological sites are expected to be disturbed or affected by the proposed project.

Source: Massachusetts Historical Commission

C. Ecological Effects

1. Might the project significantly affect fisheries or wildlife, especially any rare or endangered species?

Yes ______ No __X__

Explanation and Source:

No rare or endangered species and no significant biological systems are known to exist in the project area. The Charles River at this location is devoid of any significant fish or other aquatic life. The most common species of wildlife are pigeons (Columba livia). 33

Source: New England Division, Corps of Engineers)

2. Might the project significantly affect vegetation, especially any rare or endangered species of plant?
Yes ______ No __X__
(Estimate approximate number of mature trees to be removed: ____________)

Explanation and Source: There are no significant vegetation and no known rar endangered species of plants within the project area, which is primari a built-up and paved urban environment. Existing vegetation consists primarily of weed species along the Charles River and landscaping arou the DPW Building and the Mass. Rehabilitation Hospital.

3. Might the project alter or affect flood hazard areas, inland or coastal wetlands (e.g., estuaries, marshes, sand dunes and beaches, ponds, streams, rivers, fish runs, or shellfish beds)? Yes __X__ No ______

Explanation and Source:

Conceptual development plans propose the alteration of the Charles River edge by cutting a channel of water into the site and creating an island in the Charles. The land portion of the proposed urban renew area is not designated as a flood hazard area nor with the constructio of the new Charles River Dam is it subject to flooding.

4. Might the project affect shoreline erosion or accretion at the project site, downstream or in nearby coastal areas? Yes __X__ No ______

Explanation and Source:

Project development would stabilize the edge of the Charles River with ground cover, plantings and architectural treatment. Constructio activities could cause shoreline erosion unless erosion control procedures are instituted.

5. Might the project involve other geologically unstable areas? Yes ______ No __X__

Explanation and Source:

Although filled land, the project area has sustained buildings since the mid-19th century and is not known to be a geologically unstable area. The site is characterized by marine deposits, organic silts and fill material.

D. Hazardous Substances

1. Might the project involve the use, transportation, storage, release, or disposal of potentially hazardous substances?
Yes ______ No __X__

Explanation and Source:

Project development plans propose the construction of commercial, residential, office, hotel, exhibition and open space uses, together with circulation improvements.

E. Resource Conservation and Use

1. Might the project affect or eliminate land suitable for agricultural or forestry production?
Yes ____ No X
(Describe any present agricultural land use and farm units affected.)

Explanation and Source:

The project area is a built-up urban environment and is not suitable for agricultural or forestry production.

2. Might the project directly affect the potential use or extraction of mineral or energy resources (e.g., oil, coal, sand & gravel, ores)? Yes ____ No X

Explanation and Source:

The project area is a built-up urban environment and does not contain any known mineral or energy resources.

3. Might the operation of the project result in any increased consumption of energy? Yes X No ____

Explanation and Source:
(If applicable, describe plans for conserving energy resources.)

Preliminary plans propose the construction of approximately 3,400,000 sq.ft. of new buildings, which will result in an increase in the consumption of energy. All construction will be required to comply with energy conservation provisions of the State Building Code and other applicable regulations.

F. Water Quality and Quantity

1. Might the project result in significant changes in drainage patterns? Yes ____ No X

Explanation and Source:

The project area is primarily a built-up and paved urban environment and will remain so following redevelopment.

2. Might the project result in the introduction of pollutants into any of the following:
(a) Marine Waters .... Yes X No ____
(b) Surface Fresh Water Body .... Yes X No ____
(c) Ground Water .... Yes ____ No X

Explain types and quantities of pollutants.

Sanitary sewage from the project area will be directed into the MDC sewage system, which discharges into the Boston Harbor following primary treatment at the Deer Island Treatment Plant. Construction near the river edge and dredging activities would introduce sedimentation and turbidity, which would require mitigating measures.

3. Will the project generate sanitary sewage? Yes X No ____

If Yes. Quantity: 850,000 gallons per day (increase)*

Disposal by: (a) Onsite septic systems .... Yes ____ No X

(b) Public sewerage systems .... Yes X No ____

(c) Other means (describe) ____

* preliminary estimate

4. Might the project result in an increase in paved or impervious surface over an aquifer recognized as an important present or future source of water supply? Yes ____ No X

Explanation and Source:

The project area is not an aquifer recognized as an important source of water supply.

5. Is the project in the watershed of any surface water body used as a drinking water supply?

Yes ____ No X

Are there any public or private drinking water wells within a 1/2-mile radius of the proposed project?

Yes ____ No X

Explanation and Source:

The Charles River is not a source of drinking water supply for the City of Boston.

6. Might the operation of the project result in any increased consumption of water? Yes X No ____

Approximate consumption 850,000 gallons per day.* Likely water source(s) MDC

Explanation and Source:

Full development of the proposed project will result in a substantial increase in daily population in the area, requiring increased demands on water supply.

* preliminary estimate

7. Does the project involve any dredging? Yes X No ____

If Yes, indicate:

Quantity of material to be dredged ____

Quality of material to be dredged ____

Proposed method of dredging ____

Proposed disposal sites ____

Proposed season of year for dredging ____

Explanation and Source:

Preliminary plans propose the cutting of a channel of water into the site to create an island in the Charles River.

G. Air Quality

1. Might the project affect the air quality in the project area or the immediately adjacent area?
Yes X No

Describe type and source of any pollution emission from the project site. CO, TSP, NO_x, SO_2

Site clearance, demolition, excavation and construction activities to implement the plan will generate emissions of particulate matter; construction equipment will generate carbon monoxide and nitrogen oxide emissions. The proposed development would generate increased vehicular traffic to the area. Heating and cooling equipment could also produce emissions.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any pollution emissions caused by the project, including construction dust? Yes X No

Explanation and Source:

The Mass. Rehabilitation Hospital and some residential structures are located within the project area, and the Charles River Park residential complex is located adjacent to the project area.

3. Will access to the project area be primarily by automobile? Yes X No

Describe any special provisions now planned for pedestrian access, carpooling, buses and other mass transit.

Pedestrian amenities will be provided, including a direct connection to the Government Center/Faneuil Markets area via a Canal Street pedestrian way. Improvements are also proposed for the Green Line rapid transit system serving the North Station area.

H. Noise

1. Might the project result in the generation of noise? Yes X No

Explanation and Source:
(Include any source of noise during construction or operation, e.g., engine exhaust, pile driving, traffic.)

Increased noise levels will occur primarily during the construction period from pile driving and other construction activities. The additional traffic generated by the project will generate noise. However, removal of the elevated Green Line should improve the noise environment in the long-term.

2. Are there any sensitive receptors (e.g., hospitals, schools, residential areas) which would be affected by any noise caused by the project? Yes X No

Explanation and Source:

The Mass. Rehabilitation Hospital and a small residential area are located within the project area, and the Charles River Park residential complex is located adjacent to the project area.

I. Solid Waste

1. Might the project generate solid waste? Yes X No ____

Explanation and Source:
(Estimate types and approximate amounts of waste materials generated. e.g., industrial, domestic, hospital, sewage sludge, construction debris from demolished structures.)

During the construction period, solid waste will be generated from demolition of existing buildings, excavation, and construction activities. Following full development of project proposals, an estimated 1,835 tons of solid waste would be generated per day from residential, office, and commercial uses.

J. Aesthetics

1. Might the project cause a change in the visual character of the project area or its environs?
Yes X No ____

Explanation and Source:

New construction will replace large areas presently occupied by surface parking lots and railroad tracks, and a landscaped promenade will be provided along the edge of the Charles River. An island is proposed to be created in the Charles River.

2. Are there any proposed structures which might be considered incompatible with existing adjacent structures in the vicinity in terms of size, physical proportion and scale, or significant differences in land use?
Yes ____ No X

Explanation and Source:

Proposed structures are designed at a scale and proportion compatible with existing and surrounding structures. Proposed land uses will continue the mixed use pattern presently found in the area.

3. Might the project impair visual access to waterfront or other scenic areas? Yes ____ No X

Explanation and Source:

A public promenade is proposed along the edge of the Charles River, extending the existing Charles River linear park system.

K. Wind and Shadow

1. Might the project cause wind and shadow impacts on adjacent properties? Yes X No ____

Explanation and Source:

The extent, if any, of wind and shadow effects cannot be determined until the proposed buildings are actually designed. The highest structure contemplated is a proposed Federal Office Building (approximately 20 stories).

CONSISTENCY WITH PRESENT PLANNING

A. Describe any known conflicts or inconsistencies with current federal, state and local land use, transportation, open space, recreation and environmental plans and policies. Consult with local or regional planning authorities where appropriate.

All development within the project area will be required to conform to the Urban Renewal Plan.

FINDINGS AND CERTIFICATION

A. The notice of intent to file this form has been/will be published in the following newspaper(s) :

(Name) Boston Herald (Date) March 29, 1980

B. This form has been circulated to all agencies and persons as required by appendix 3.

March 31, 1980
Date

Signature of Responsible Officer or Project Proponent

Robert J. Ryan, Director
Name (print or type)

Address Boston Redevelopment Authority
Boston City Hall, Boston, MA 02201

Telephone Number 722-4300

March 27,1980
Date

Signature of person preparing ENF (if different from above)

Richard B. Mertens, AICP
Name (print or type)

Address Boston Redevelopment Authority
Boston City Hall
Boston, MA 02201

Telephone Number 722-4300

PROPOSED NORTH STATION
URBAN RENEWAL AREA

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

BOS

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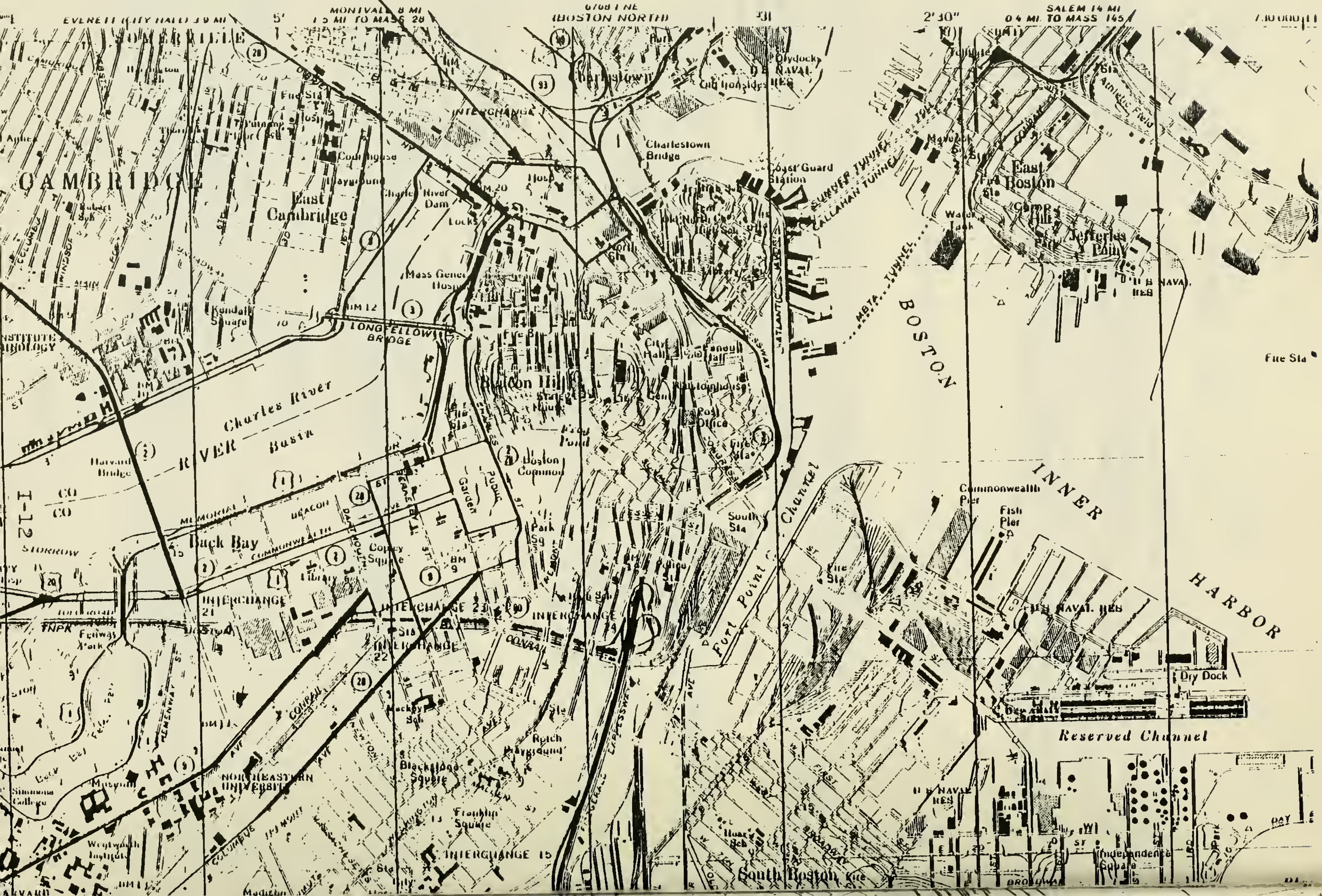
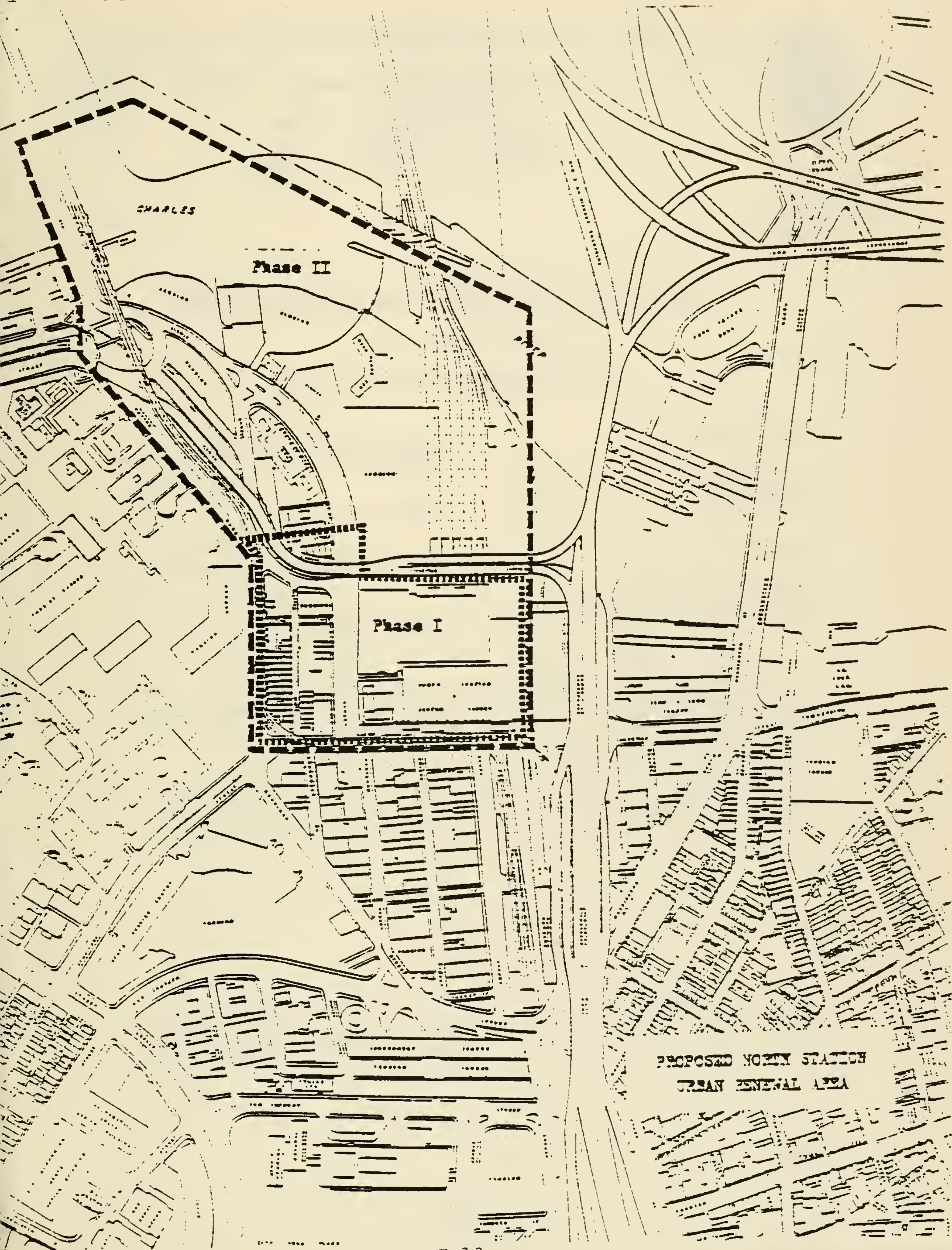




PROPOSED NORTH STATION URBAN RENEWAL AREA

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

ON

ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME: North Station Urban Renewal
Boston

EOEA NUMBER: 03728

PROJECT PROPONENT: Boston Redevelopment Authority

DATE NOTICED IN MONITOR: April 7, 1980

Pursuant to M.G.L., Chapter 30, Section 62A, and Section 10.04(9) of the Regulations Governing the Implementation of the Massachusetts Environmental Policy Act, I hereby determine that the above referenced project does require an Environmental Impact Report.

May 14, 1980
DATE

Samuel C. Mygatt for
JOHN A. BEWICK, SECRETARY

FORM A

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
Governor
JOHN A BEWICK
Secretary

DETERMINATION OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS OF SCOPE AND ALTERNATIVES FOR ENVIRONMENTAL IMPACT REPORT

PROJECT NAME:	North Station Urban Renewal Boston
EOEA NUMBER:	03728
PROJECT PROPONENT:	Boston Redevelopment Authority
DATE NOTICED IN MONITOR:	April 7, 1980

Pursuant to Massachusetts General Laws, Chapter 30, Section 62A, and Section 10.05(1) of the Regulations Governing the Implementation of the Massachusetts Environmental Policy Act, I hereby issue the attached determination of scope and alternatives for the Environmental Impact Report on the above-referenced project.

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

SCOPE, SPECIFIC PROCEDURE, AND ALTERNATIVES
FOR
NORTH STATION, EOEA NO. 03728

I. SPECIFIC PROCEDURE

This project is herewith designated, as requested in the letter of the proponent, dated March 31, 1980, as a"major and complicated project", pursuant to G.L. c. 30, sec. 62A. The special procedure for evaluation and review of the project shall be as follows:

a. A Draft EIR shall be submitted for review, which contains a detailed examination of the impacts of Phase I and a generalized examination of the impacts of Phase II, as further scoped below.

b. The Draft EIR shall be reviewed as an Interim EIR pursuant to G.L. c. 30, sec. 62D, and, if an appropriate finding is made, approval of a 121B plan may occur. Should the 121B plan allow for land acquisition for Phase II activities, approval of such a plan shall be conditioned upon no Phase II land acquisition occurring until after review of the Final EIR on Phase II.

c. A Final EIR shall be submitted on Phase I. Review of such EIR shall be submitted on Phase I. Review of such EIR shall complete MEPA review of Phase I.

d. Submission of a Phase II Final EIR shall be required prior to proceeding with Phase II. For Phase II only, review of further ENF, re-scoping or submittal of a supplemental Draft EIR for Phase II may be required, depending upon the circumstances at the time.

e. The EIS being prepared by the U. S. General Services Administration shall also be reviewed as part of this major and complicated project. In addition, pursuant to MEPA regulation 10.16, this Specific Procedure may be modified to permit other state agency activities in the project area to be reviewed as part of this major and complicated project.

PHASING AND ALTERNATIVES

The project as outlined by the BRA includes two basic phases:

Phase I: 5-6 years. Green Line relocation and removal of existing elevated GSA Building construction and other buildings within Phase I area. Street Modifications to Portland/Nashua and Marth Way/Lomasny and Merrimac Street.
Extension of the rails to North Station.

Phase II: 15-20 years. Development of the Phase II parcel with or without removal of Connector ramps to the central artery

a. Development of housing, office, hotel, public uses and parking option, in a general format with specified densities and land uses, based upon the Safdie study concept.

b. Development of housing hotel, office or other uses on a significantly less dense scale, emphasizing maintenance or rehabilitation of existing buildings, such as 100 Nashua Street and the Mass. Rehabilitation Hospital, combined with an extension of the Esplanade.

c. (Optional) Any other or intermediate level of land development which the proponent may wish to include and evaluate in the EIR. Thus, the proponent is encouraged to assess as flexible a range of alternative land use plans as appears warranted for the purposes of an EIR.

TRANSIT: GREEN LINE RELOCATION ALTERNATIVES

The BRA may use whatever preliminary information is developed by the MBTA in the analysis of Green.Line options in the North Station area. However, it may be necessary for the BRA to develop and present alternatives in the event that the schedule for the North Station EIR significantly precedes MBTA studies of the Green Line.

BRA studies of Green Line options should include at least a feasibility study and environmental overview of the numerous possible options in the North Station area. The transit alternatives should include at least the following:

1. The No Build/No action base conditon, for comparison

2. Green Line relocation, with any part of the alignment at-grade. (It should be noted that at-grade transit operations present severe conflicts with traffic and pedestrians, especially on Causeway Street).

3. Green Line relocation (elevated) down Accolon Way and across Nashua Street, to connect to Science Park Station.

4. Green Line (below grade) along existing alignment, rising to join the Science Park Station.

5. Green Line (below grade) underneath Causeway and Boston Garden rising

to join elevated Science Park Station.

6. Green Line relocation (below grade) under Causeway, Boston Garden, and the Charles River, continuing to Lechmere Square in Cambridge.

7. Green Line relocation (below grade) along Merrimac Street between Haymarket and Science Park.

8. Replacement service by bus from Lechmere to North Station.

9. Any other practical alternatives which may be developed during the course of the preparation of the EIR.

COMMUTER RAIL OPTIONS

A reasonable range of commuter rail possibilities should be assessed, including extending the existing tracks, building high level platforms, decking over the tracks and providing the necessary ventilation. Service and environmental impacts of the various alternatives should be compared, including possible mitigating actions.

HIGHWAY ALTERNATIVES

Local street improvements appropriate for the various treatments of the Green Line should be presented. The current proposal for the Urban Renewal area is critically dependent upon relocation of the Green Line, even for Phase I, while currently neigher Phase I nor Phase II is now specifically dependent upon proposed improvement to the Central Artery and Leverett Circle ramps. Thus, the EIR to be prepared by the BRA must clearly spell out the options for transit and interrelationship to land development, while the Report should treat Central Artery options as a separable project. However, this EIR must assess all available alternatives for Central Artery ramp modifications at the time of EIR preparation and should identify any possible conflicts of structures, foundations, etc. Preliminary plans for Central Artery connectors should be presented graphically in the EIR.

An assessment should be made of potential conflicts of Phase II development with possible alignments for highway or transit improvements in the North Station area, specifically Green Line relocation and Central Artery reconstruction.

****

SCOPE OF ISSUES

1. TRAFFIC ANALYSIS:

The traffic study area should include the proposed Urban Renewal area and adjacent areas within the following perimeter: Merrimac Street/Martha Way/Lomasney Way, New Sudbury Street, North Washington Street and the Charles River, including the intersections along this perimeter, with special emphasis on Leverett Circle, Keany Square, Haymarket Square, and the Causeway ramps to the Central Artery. Existing road conditions should be described with ADT counts, PM peak hour intersection counts and estimated level of service. Similarly, build alternatives should have similar data presented and compared. Pedestrian movements should be taken into account. For convenience of using the same data for both traffic and air analysis, assume 1987 traffic conditions for Phase I and 1995-2000 for completion of Phase II.

Wherever traffic congestion/capacity problems occur today or with future development, proposals should be offered to reduce or mitigate such impacts, including capacity improvements, split shifts or improvements to other travel modes.

2. PEDESTRIAN CIRCULATION:

A preliminary plan showing roadway improvements and pedestrian circulation routes, keyed into land uses and transit access should be submitted. Qualitative assessment of pedestrian circulation should be discussed in the text, with emphasis on Phase I and pedestrian circulation and street crossing in the North Station area. Similarly, pedestrian/bicycle circulation from the Storrow Esplanade to the urban renewal site and any extended parkland should be presented and discussed.

3. AIR POLLUTION:

Use of an approved computer model for air quality, such as Caline 3, would obviate the need for model calibration. However, there should be monitoring of existing air quality for on-going violations and to determine a reasonably accurate background level of carbon monoxide.

CARBON MONOXIDE:

1. One continuous CO monitor
   a. Location: midblock on Causeway Street
   b. Time period: three months
   c. Continuous meteorological data to be provided onsite.

2. Four satellite stations: three to four ecolyzers/station
   a. Location:
      1. Leverett Circle
      2. Intersection of Merrimac Street and Stanford Way

3. Intersection of New Chardon Street and Washington Street
4. Intersection of North Washington Street and Causeway Street

b. Time Period:

1. Duration - each station should be monitored three times during the continuous three month monitoring period on the appropriate design day as determined in the traffic analysis. A rotation of the stations to be monitored each week on the particular design day is necessary to obtain three readings per station over the three month period.

2. Frequency - eleven to twelve hours per day.

3. Include a portable monitor above the El. This information will be useful for future analyses concerning the removal of the EL.

NO_x,TSP

No monitoring will be required for these pollutants at this time. A modeling analysis similar to that being completed for South Station will be required. It should be noted that DEQE, is considering conducting their own monitoring program for NO_x and TSP within the North Station area in the near future if space can be obtained for locating the necessary equipment. The data that would be generated from this station would be very useful in assessing the air quality impacts from any future development proposals for this area. The Point Source analysis assumptions should be made according to those elements listed in the May 15, 1980 memorandum of Bruce Maillet, Chief, Air Quality Control Section, DEQE/NE.

4. NOISE:

Clearly, there are several noise generators in the area now which contribute to undesirable noise conditions, among them being the rumble and squeal of the elevated Green Line trains, the helicopters using the heliport, trucks and cars using the elevated ramps and local streets, and the commuter trains at North Station. A qualitative assessment should be made of the extent to which any land use and transportation alternatives will reduce or increase noise levels compared to existing conditions.

5. WIND AND SHADOW:

Build and No-build alternatives should be compared for wind and shadow impacts created by both transit and building structures. Building heights under consideration for both Phase I and II should be discussed.

6. AESTHETICS:

The existing Green Line elevated is generally criticized for having a blighting influence. Specific factors which have depressed the area and limited development include darkness and shadow, noise, dirt, and an unappealing steel sturcture. These environmental concerns are particularly detrimental to the pedestrian and to people occupying the first, second and third floors of buildings adjacent to the elevated structure. The importance of aesthetics and the pedestrian experience to the urban environment is very clear in the North Station area; studies of alternate treatment of the Green Line relocation and building design should present graphic and descriptive comparisons of the area from a pedestrian viewpoint.

7. PARK AND RECREATION USES:

Discussion of the implications for public access to the river and use of the river, including boat access and passage through the locks of the new Charles River Dam. An explanation should be offered as to why the urban renewal boundaries extend into the river and occupy MDC land and facilities.

The Construction associated primarily with Phase II would have significant impacts on the Charles River. The Commonwealth, specifically the MDC, could be involved in a major role in dredging, riverbank reconstruction, parkland developemnt, sewer consturction and control of river uses, especially boating and flood control. Thus, the BRA EIR for North Station should also be perceived as preliminary to a future more detailed EIR and design study by the MDC for improvements to the Charles River, in the same manner that Green Line Assessment is preliminary to an MBTA Green Line EIS/EIR and engineering/construction effort.

8. COMMERCIAL RIVER USAGE:

Commercial boats now use the dam to make oil deliveries and aslo to provide maintenance and construction support for MDC activities in the Charles River. Any limitations on passage of such boats should be clearly identified in the EIR and where possible all existing boat uses should be provided for.

9. UTILITIES

Detailed analysis of utility dislocations is not required. However, all major existing and proposed drainage facilities should be identfied, including control of combined sewer overflows. If a new structure in any of the alternatives interferes with these major utilities, this conflict should be identified in the EIR.

10. ENERGY:

Potential energy savings through structural recycling, building design and transportation planning/operations should be analysed.

11. SOLID WASTE:

An estimate should be made of building wastes, and operational production of solid wastes. Efforts to minimize waste generation or disposal impacts should be presented.

12. HISTORICAL:

Include a brief review of project area development history and assessment of historical values of any structures of sites within the Urban Renewal area, with the assistance of the Mass Historic Commission. The proposed urban renewal area does include sections of the Charles River Basin and the Green Line concerete arch viaduct, which are currently on the National Register of Historic Places.

A plan should be shown of the land areas now owned by private parties, institutions, the City and the Commonwealth. It would appear that the land now occupied by railroad facilities and the river and the land underneath is held in title by the Commonwealth. Responsibilities of the MDC and DEQE Waterways in this regard should be clarified.

RELATION TO ADJACENT DEVELOPMENT PROJECTS

In addition to proposed transit and highway work by MBTA and MDPW respectively, there are several nearby projects undergoing various stages of development or planning: Charlestown Navy Yard, Cambridge Lechmere Square and the on-going North Terminal study on Cambridge and Somerville. It is tentatively proposed that the funcitons of citizen participation and agency participation be included within the established North Terminal Area steering Committee, under the coordination of the MAPC.

The structure of the EIR should comply with 301 CMR 10.05 (a), (b) and (c). It shall also include a copy of this scope and specific procedure.

May 14, 1980
DATE

JOHN A. BEWICK

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

SUPPLEMENTAL STATEMENT
OF
SPECIAL PROCEDURE

PROJECT NAME:	North Station Urban Renewal, Boston
EOEA NUMBER:	03728
PROJECT PROPONENT:	Boston Redevelopment Authority
DATE NOTICED IN MONITOR:	April 7, 1980

The document entitled Scope, Specific Procedure and Alternatives for North Station, EOEA No. 03728 dated May 14, 1980 is hereby amended by adding to paragraph 1 b the following sentences:

"At the proponent's discretion, an interim EIR may be submitted, pursuant to M.G.L. c. 30 sec 62D, prior to submission of the Draft EIR. In such event, approval of a 121B plan may occur after review of the interim EIR, subject to the Secretary's approval and appropriate constraints."

DATE

JOHN A. BEWICK, SECRETARY

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

January 5, 1981

Mr. Charles Steward
Environmental Section
MBTA
50 High Street
Boston, MA

Dear Mr. Steward:

RE: North Station EIR, EOEA No. 03728

In response to your letter of December 9, 1980 (copy attached) we have conside the suggested Scope, and the issues raised by the BRA Interim EIR.

We are in general agreement with the supplemental scope suggested by you, with the following caveats:

1. Alternatives. It is perhaps self-evident that of the preferred alternatives you propose to study, certain modifications may become desirable as you continu your planning. We often make this explicit in our scopes; you need only recogn that flexibility is a virtue, as your study progresses.

2. Nashua Street. The BRA has proposed in the Interim EIR to eliminate Nashua Str The consequences of this are shown to be detrimental, and perhaps devastating, to traffic flow. Since both traffic and air quality are already severely impacted in the project area, a worsening of them may not be environmentally acceptable. One solution may be to retain Nashua Street, at least as a two-lan one-way route, without curb-side parking, in the vacinity of Casueway Street. We will be pursuing this issue with the BRA.

   This relates to your subject of study, inasmuch as one option preferred by the MBTA has a tunnel portal which would effectively block off Nashua Street. Consequently, I believe your office should meet with Steve Kaiser of EOEA and wi BRA staff to explore this issue further. After staff-level discussions have ta place, I will formally issue a Supplemental Scope recognizing the MBTA's role in the BRA North Station EIR (a "major and complicated project") and creating a review vehicle for the MBTA EIS.

Sincerely,

Samuel G. Mygatt

Samuel G. Mygatt
Executive Director
Environmental Impact Review

SGM:jc

cc: R. Mertens, BRA

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

50 High Street, Boston, MA 02110

RECEIVED
DEC 10 1980
ICE OF THE SECRET
NMENTAL AFF

December 9, 1980

Mr. John A. Bewick, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Attention: MEPA Unit

Dear Mr. Bewick:

Supplemental EIR Scope - Green Line and
Commuter Rail Improvements at North Station

The Massachusetts Bay Transportation Authority is pleased to submit its suggested scope for an EIR supplement to the Boston Redevelopment Authority's EIR for its North Station Urban Renewal Project (EOEA No. 03728), addressing additional impacts of proposed transit improvements in the North Station area. This approach was suggested by Messrs. Samuel Mygatt and Steven Kaiser of your MEPA Unit at a prescoping meeting held at your offices on July 2, 1980.

Our suggested scope is the result of a five-month preliminary planning, engineering, and urban design analysis of alternative Green Line improvements at North Station and their interface with commuter rail and existing and proposed development in the area. This process, performed in a cooperative fashion with the BRA's own North Station studies, has refined and screened Green Line alternatives until four "build" alternatives and one "no build" remain. These will be carried forward, along with related improvements to the commuter rail facilities at North Station, into a combined Federal/State DEIS/DEIR phase. The four "build" alternatives, designated as Alternatives 3, 5A, 5C and 7 in a Preferred Alternatives Rport which is currently in preparation, are respectively the Authority's preferred elevated and subway alternatives for this project.

Our suggested scope also derives from reviews of the following documents: EOEA's scoping determination for the BRA's North Station EIR (EOEA 03728) dated May 14, 1980; the BRA's Interim EIR for that project itself, based upon which we forwarded the Authority's review comments on October 9, 1980 (and attached here as Exhibit A); and EOEA's comments on the BRA's Interim EIR dated October 23, 1980. Finally, in the interests of preparing a single environmental document which meets both Federal (NEPA) and State (MEPA) clearances, our suggested scope is consistent with UMTA's scoping issues identified at its scoping meeting on October 8, 1980 and summarized in its memorandum attached here as Exhibit B.

With all the above considerations in mind, the Authority proposes to address its four "build" Green Line alternatives (three subway and one elevated), improvements to commuter rail facilities at North Station, and the "no build" alternative in a joint Federal/State EIS/EIR, which scope will address the following categories of environmental impact:

1. Land use urban redevelopment and joint development, including integration of rapid transit and commuter rail improvements with other new development projects and business and residential displacements and relocation.

2. Transportation impacts, including transit service and patronage, roadway/vehicle circulation, and pedestrian circulation and access.

3. Noise impacts arising from the Green Line and commuter rail facilities, including ambient measurements, modeling, and considerations of acoustical treatment.

4. Historic preservation, including adherence to the procedures of the Federal Section 106 and Section 4(f) acts for National Register properties.

5. Aesthetic impacts, both with regard to scale and visual compatibility with the surroundings.

6. Construction impacts, including air quality, noise, traffic maintenance, safety, utility disruption, and business and residential disruption, with careful consideration being given to construction staging as it relates to both demolition and removal of of the existing structure and new construction.

The Authority and our consultants for this project will make ourselves available to your MEPA Unit to discuss our proposed scope at your convenience.

If there are any questions, please contact me at 722-3152.

Very truly yours,

Charles B. Steward

Charles B. Steward
Environmental Coordinator

Encs: Exhibits A & B.
CBS/ab

cc: S. G. Mygatt (W/Encs.)

Dick Mertons

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

SECOND SUPPLEMENTAL STATEMENT

ON

SPECIAL PROCEDURE

PROJECT NAME: North Station Urban Renewal, Boston

EOEA NUMBER: 03728

PROJECT PROPONENT: Boston Redevelopment Authority, MBTA,

This document modifies and supplements the Scope, Specific Procedure and Alter tives document dated May 14, 1980 and the Supplemental Statement of Special Procedu dated August 4, 1980. Its intent is to establish under MEPA the Scope for the EIR/ EIS to be prepared by the MBTA and reviewed in conjunction with the BRA North Stati EIR/EIS and the GSA Federal Office Building EIR/EIS.

With certain qualifications, I adopt as Scope for the MBTA EIR/EIS the Scope put forward in the attached December 9, 1980 letter to me from the MBTA. The qualifications are as follows:

1. The May 14 Scope required the BRA to assess eight Green Line Alternatives. Th Preliminary Alternative Analysis Report (Appendix G to BRA North Station Inter EIR) concluded that only four of these (Alternatives 3, 5a, 5c and 7) were feasible. I understand that subsequently a Preferred Alternatives Report has reduced the number of alternatives to two: 3 and 5c. This latter report has received MEPA review. Therefore, the MBTA EIR/EIS should describe its conclusions. In addition, copies should be circulated to this office and to the MDC when the MBTA EIR/EIS is filed, and should be available for public review in MBTA offices.

2. My Certificate dated October 23, 1980 on the BRA North Station Interim EIR con tains three paragraphs of comments relating to Green Line relocation and roadway modification. The MEPA staff has in addition discussed with BRA and MBTA concerns relating to the traffic impacts of alternative 5c. These comments an concerns will need to be addressed in the BRA North Station EIR/EIS; if the

Green Line EIR/EIS is however filed first for review, it should contain some discussion of those issues, so that planning does not proceed too far before they are resolved.

3. It is understood that this Scope in addition provides leeway for evaluating any other alternatives which evolve during the environmental review process.

JAB:SGM:jc

April 3, 1980
DATE

Samuel G. Mygatt for
JOHN A. BEWICK, SECRETARY

FEDERAL CONSULTATION / COOPERATING AGENCY DOCUMENTATION

MEMORANDUM

TO: North Station Files/Lead Agency - Cooperating Agency Designation

FROM: Richard Mertens

DATE: July 17, 1981

SUBJECT: Lead Agency - Cooperating Agency Consultation Meeting: July 16, 1981

A consultation meeting to discuss the North Station Renewal Project EIS and the lead agency - cooperating agency designation was held in the Boston Redevelopment Authority Board Room, July 16, 1981.

In attendance were:

Richard Mertens	BRA	722-4300
Owen Donnelly	BRA	722-4300
Robert Kroin	BRA	722-4300
Leon Jacklin	BRA	722-4300
Gary Ritter	UMTA	494-2055
Betsy Higgins	EPA	223-0400
Donald Cooke	EPA	223-4635
Ernest Stevens	GSA	223-2773
William Patterson	DOI	223-5517

The meeting opened with an introduction and explanation of the purpose of the meeting and status of the environmental review by Mertens, followed by a presentation of the background and status of the project by Donnelly and a description of the project and alternatives by Kroin.

During the ensuing discussion, the following points were noted by the agencies in attendance:

EPA: EPA saw their role principally as involvement in the air quality analysis and in the future Section 404 (C of E dredging) permits but not as a cooperating agency in the preparation of the EIS.

Coordination was requested through Betsy Higgins of the Environmental Impact Office.

EPA requested a meeting be set up with DEQE and BBN to review the air quality impact analysis. Tom Wholly (Air Branch) would represent EPA.

UMTA: UMTA indicated a willingness to cooperate but did not see themselves as writing any sections of the EIS. UMTA's Green Line EIS will be incorporated into the North Station EIS as appropriate, and by reference.

DOI: DOI also indicated a willingness to cooperate in the same manner as UMTA. They did not see themselves as a cooperating agency, based on the magnitude of their involvement.

DOI indicated their concerns involved (1) recreation (2) historic properties, and (3) alteration of shoreline.

With respect to shoreline alteration, compliance with the Fish and Wildlife Coordination Act will be required (contact Fish and Wildlife Office, Concord, N.H.).

DOI pointed out that the EIS should indicate any justification for other development as a result of the Phase I development (Phase II and/or other) - secondary impact. DOI also expressed concern with the density of the proposed housing and the apparent lack of open space on the island, but recognized the conceptual nature of the proposal.

GSA: BRA should contact Beverly James for formal response to request for cooperating agency status.

EPA, UMTA, and DOI will forward formal letters indicating their response.

It was noted that both H.U.D. and the Corps of Engineers declined to participate as cooperating agencies at this time, due to lack of imminent direct involvement in the project. It was also noted that FHWA had not responded.

LA/0458/4455

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

August 6, 1981

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
1 City Hall Square
Boston, MA 02201

RE: Cooperating Agency
North Station Urban Renewal Project

Dear Mr. Mertens:

Thank you for your letter of July 8, 1981 requesting EPA to be one of the cooperating agencies for the proposed North Station Urban Renewal Project Environmental Impact Statement (EIS). As agreed at your July 16 meeting, our role will be advisory, participating in the early coordination process, and following the stages of development of the required environmental documents.

From the brief description of the proposed project provided at the July 16 meeting, we anticipate air quality, 404 permit and noise as major areas of special interest to EPA. On July 23 EPA and DEQE met with BRA and your consultant (Bolt, Beranek and Newman, Inc.) to discuss the air quality analysis. Bolt, Beranek and Newman, Inc. is presently writing a synopsis of the meeting. The 404 permit action is associated with the development of the Charles River Island and Canal which is proposed during the second phase of the development. We have submitted copies of "EPA's Guidelines for Specification of Disposal Sites for Dredged or Fill Material" (44 CFR 54222-54251) to you, and we will be using these 404(b)(1) guidelines to evaluate any proposed 404 action.

With respect to potential noise issues, the noise study by BBN and the scope of the proposed noise analyses have undergone EPA internal review. The BBN noise analysis indicates noise levels which are not expected to change adversely, but still predicts decibel levels for the proposed housing area which are unacceptable under HUD noise criteria for residential areas. While it is likely that acoustical insulation of the proposed hotel will mitigate the noise impact on guests, the proposed housing may not have similar advantages. We believe the EIS should address the need for new housing and investigate alternative land use designations for Sub Area II given these potentially unacceptable noise levels. The EIS's noise analysis should also address the impact of pure-tone noise emissions from wheel-rail interactions.

Finally, we believe that although the North Station Urban Renewal Project is separated into Phase I and Phase II, the impacts of the total project should be addressed in the EIS, since incremental impacts from the individual phases may not equal the total impact of the full build scheme.

I would appreciate your keeping my office informed during the development of the North Station Urban Renewal Project. Please contact Mr. Donald Cooke of my staff at 223-4635 if you wish to discuss these comments or if we can assist you in any way.

Sincerely,

Wallace E Stickney

Wallace E. Stickney, P.E.
Director
Environmental Impact Office

March 3, 1849

United States Department of the Interior

NATIONAL PARK SERVICE

North Atlantic Region
15 State Street
Boston, Massachusetts 02109

N REPLY REFER TO:
L7619
ER 81/1513

August 20, 1981

Mr. Richard B. Mertens
Environmental Review Officer
Boston City Hall
1 City Hall Square
Boston, MA 02201

Dear Mr. Mertens,

This responds to the July 30, 1981 Federal Registry notice (pp.39036&7) by the Department of Housing & Urban Development concerning the preparation of an Environmental Impact Statement for the North Station Urban Renewal Project. We have reviewed the notice and see no need for the National Park Service to become a co-producer of the Statement, however, we offer the following concepts as comments we would like to see considered:

1. Continuation of the greenspace along the Charles River connecting the Charles River Embankment with the new Charles River Dam and locks.

2. An information kiosk in any new North Station transportation center providing information about Boston National Historical Park as called for in a recent transportation study.

3. Consideration of a light rail line from the North Station area to the Navy Yard to provide better vehicle access.

We offer these comments solely from the National Park Service as directed by our Department of the Interior, Office of Environmental Project Review. You should understand that these are views only of the Service and do not predispose any position our Department may take in the future.

We look forward to reviewing the Draft Environmental Statement and take this opportunity to remind you that it must be sent to:

Director
Office of Environmental Project Review
U.S. Department of the Interior
18th & C Streets, NW
Washington, DC 20240

Sincerely yours,

Steven H. Lewis

Steven H. Lewis
Acting Regional Director

cc: Office of Environmental Review(PEP-DOI-Washington)
Superintendent, Boston National Historical Park

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:

NEDPL-I

21 July 1981

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
1 City Hall Square
Boston, Massachusetts 02201

Dear Mr. Mertens:

As follow up to your conversation of 15 July 1981, with Mr. Robert Adler of my staff, this letter presents our understanding of that discussion. We initiated contact with you after receiving your letter of 8 July 1981, to Colonel Edgar, on the North Station Urban Renewal Project. The letter requested our involvement as a cooperating agency and invited us to a scoping meeting for developing an EIR/EIS. It was felt that our involvement would result from the Corps of Engineers responsibility for Section 10 and Section 404 permits.

From the conversation we understand that the present EIR/EIS activity and scoping meeting is related principally to Phase I plans which do not involve work requiring Corps regulatory permits. It appears that our involvement is associated with Phase II work for filling and dredging within the Charles River. We understand that Phase II, however, is in a conceptual stage and is not under active implementation nor is it the subject of your present EIR/EIS work. As such, our involvement as a cooperating agency and our attendance at the scoping meeting does not appear necessary at this time. Further, we understand that there will be a separate EIR/EIS developed for Phase II activity which may not occur for several years. Our involvement would be most beneficial and appropriate at the time you begin active planning and scoping for Phase II.

NEDPL-I
Mr. Richard B. Mertens

21 July 1981

Please maintain us on your mailing list and keep us informed of your planning process. Should you have any questions or need additional information please contact Mr. Adler at 894-2400, extension 231. Thank you for the opportunity to make comments at this time on the renewal project.

Sincerely,

JOSEPH L. IGNAZIO
Chief, Planning Division

U.S. Department of Transportation
Urban Mass Transportation Administration

Region I
Connecticut, Maine,
Massachusetts,
New Hampshire,
Rhode Island, Vermont

Transportation Systems Center
Kendall Square
Cambridge, Massachusetts 02142

July 16, 1981

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

Dear Mr. Mertens:

As your July 8, 1981 letter noted, the Urban Mass Transportation Administration (UMTA) is involved with a proposed project within the North Station Urban Renewal Project area.

Our involvement stems from the Massachusetts Bay Transportation Authority's (MBTA's) proposal to use UMTA funds to rehabilitate or relocate the Green Line rapid transit facility in the North Station area. The MBTA is preparing a Draft Environmental Impact Statement for the project.

As Mr. Ritter of our Planning Assistance Division indicated during your July 16, 1981 meeting, the MBTA's Environmental Impact Statement (EIS) should address the significant environmental issues with respect to the Green Line, and such information could be used by you when developing the EIS for the North Station Urban Renewal Project. Furthermore, we will be pleased to participate as a cooperating agency to facilitate your coordination with UMTA-funded, MBTA developments in the North Station area.

Please do not hesitate to contact Mr. Don Bell at 494-2729 when you require our assistance.

Sincerely,

Richard H. Doyle
Regional Administrator

cc: C. Steward, MBTA
E. Thomas, UPM-12
E. Fleischman, UTA-30(w/BRA letter)

March 3, 1849

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Project Review
15 State Street
Boston, Massachusetts 02109

July 17, 1981

Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
1 City Hall Square
Boston, Massachusetts 02109

Dear Mr. Mertens:

As requested, this is to confirm some of the comments I made at the scoping meeting for the North Station Urban Renewal Project which you held on July 16.

Given the very limited nature and scope of this Department's possible involvement in Phase I, it is not appropriate for it to serve as a cooperating agency in the development of the environmental impact statement. On the other hand, we are prepared to provide on a continuing basis such technical assistance as our available resources will permit. As the need arises, please contact me or the following Interior offices.

Field Supervisor
Ecological Services
U.S. Fish & Wildlife Service
P.O. Box 1518
Concord, New Hampshire 03301

Regional Director
National Park Service
15 State Street
Boston, Massachusetts 02109

Sincerely yours,

William Patterson

William Patterson
Regional Environmental Officer

General
Services
Administration

Region 1
John W. McCormack Post Office and Courthouse
Boston, MA 02109

July 17, 1981

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
1 City Hall Square
Boston, MA. 02201

re: City of Boston Environmental Impact Statement, North Station Urban Renewal Project

Dear Mr. Mertens:

Confirming your discussion yesterday with Beverly James, Director of our Operational Planning Staff, please be advised that we do not deem it necessary to participate as a cooperating agency in the subject environmental impact statement. GSA has published its final environmental impact statement for the proposed construction of a Federal Building in the North Station area, and a copy of that statement and the record of decision are available and may be incorporated or referenced in the City's environmental document.

Sincerely,

L. F. BRETTA
Regional Administrator

INTER-OFFICE COMMUNICATION

TO NORTH STATION FILES/LEAD AGENCY-COOPERATING AGENCY DESIGNATION

FROM Richard Mertens

DATE July 15, 1981

SUBJECT HUD RESPONSE TO COOPERATING AGENCY STATUS - NORTH STATION EIS

Telephone conversation with David Prescott, HUD regional environmental officer (Region I), July 15, 1981:

With reference to my letter of July 8 requesting HUD's participation in a lead agency/cooperating agency consultation for the North Station EIS, Mr. Prescott informed me that, due to HUD's staff limitations and the fact that potential HUD involvement in the project (non-CD) through one or more housing programs was not foreseen in the near future (probably not for 5-10 years at the earliest), HUD had decided to decline to participate as a cooperating agency at this time.

FEDERAL OFFICE BUILDING EIS ADOPTION DOCUMENTATION

CITY OF BOSTON
OFFICE OF THE MAYOR
CITY HALL BOSTON

KEVIN H WHITE
MAYOR

October 27, 1981

Ms. Nancy Nord
General Council
Council on Environmental Quality
722 Jackson Place, N.W.
Washington, D.C. 20006

Dear Ms. Nord:

The purpose of this letter is to request approval of alternate procedures, pursuant to 40 CFR Part 1506.11, to comply with the National Environmental Policy Act (NEPA), as proposed herein, because emergency circumstances make it infeasible to comply strictly with C.E.Q. regulations with regard to a project of vital importance to Boston.

The City of Boston, through the Boston Redevelopment Authority, is undertaking a major mixed-use development project in a 45 acre area of the downtown, known as North Station. This area is deteriorating, open and blighted, and despite a positive location is not attracting private investment. As planned, the North Station Project will achieve substantial public benefits: increase the tax base, create new jobs, provide much needed public facilities which are important to the local economy and accomplish significant transportation improvements. In sum, the project is one of my administration's top priorities.

The project is being carried out pursuant to Massachusetts urban renewal statutes (M.G.L. Chapter 121B). A citizen project advisory committee, organized as the North Station Project Advisory Corporation, has assisted the City during the planning of the project and will continue this role throughout its implementation. The North Station Urban Renewal Plan was adopted and approved by the Boston Redevelopment Authority on July 31, 1980, after a public hearing. On July 16, 1980 the plan was approved after a second public hearing by the Boston City Council, which also authorized City capital bonds to carryout the first phase of the Plan. The Commonwealth of Massachusetts approved the Plan on January 19, 1981 on the basis of State required documents and a Massachusetts Interim Environmental Impact Report.

The key component to the initiation and success of the project is the construction of a major Federal office building which will bring about investor confidence in the area and facilitate the extensive cooperation needed among Federal, State and City agencies. The City aggressively sought to convince the General Services Administration to locate the proposed 800,000 square foot Federal building in the North Station section of downtown by proposing to undertake the redevelopment of the area and by offering to prepare and convey the site to GSA at a nominal cost. The General Services Administration accepted the City's offer in the fall of 1980 but with the condition that the site would have to be made available no later than October, 1982. GSA had determined that this was the latest date construction could begin and be completed within the appropriation available for the project. If this deadline is not met by the City, the Federal building will be lost and the larger project will likely not move forward for years to come, if ever.

When the State approved the North Station Urban Renewal Plan in January 19, 1981 it was expected that the Boston Redevelopment Authority would begin to execute the project by acquiring real estate for the Federal building site. In November 1980, however, a State-wide referendum was passed by the electorate which limited the taxing authority of all municipalities. This has had the effect of reducing the capacity of municipalities to sell bonds. The impact has fallen heaviest on older, center cities such as Boston. It has resulted in Boston suspending all capital improvement projects and concluding that it would not be feasible to enter the bond market in the near future. In the spring of this year it became clear that Boston would not be able to raise funds for the North Station project through a bond issue in a time frame which would meet the GSA deadline of October 1982. It was then decided that the City would seek authorization from the Department of Housing and Urban Development to use Section 108 of the Housing and Community Development Act of 1974, as amended, to obtain the funds necessary to prepare the Federal building site. An amendment to the City's CDBG application and the Federal environmental review procedures were initiated this past summer. The application amendment was approved by H.U.D. on September 30, 1981.

The City is undertaking the environmental impact analysis on the basis of the total urban renewal project which encompasses two major phases, multiple project components and a 15-year implementation period. Preparation of the site for the Federal building, for which the Section 108 funds have been granted is but one component of the first phase of the project. This approach has been taken by the City because of the significance of the project impacts on the environment and because Federal funds are expected to be used for several project elements over the years. This approach, however, presents the City with a dilemma. On the one hand, completion of the total project EIS is not expected until March 1982. The Authority, on the other hand, must initiate acquisition and relocation for the Federal site by December 1, 1981 in order to meet GSA's deadline of October 1982. To accomplish this it is necessary to seek and obtain the release of funds from H.U.D. on or before December 1, 1980. We therefore request under these emergency conditions that you approve the procedures outlined below.

We also would like to note that the General Services Administration did prepare an E.I.S. for the proposed Federal office building, which document included an evaluation of locating the new facility in the North Station project area. A final E.I.S. was published on July 9, 1980, following a public hearing on the North Station site held by G.S.A. on May 6, 1980. This E.I.S. fully described the environmental impacts of constructing the new building, including those associated with property acquisition and relocation activities. In March of 1981, the Regional Administrator issued a Record of Decision recommending the North Station site as the preferred site for the new Federal office building.

The City will comply with C.E.Q. standard procedures in undertaking a complete E.I.S. for the overall North Station Urban Renewal Project including the Federal office building. We would request, however, that H.U.D. be permitted to release Section 108 funds as soon as possible for the acquisition and relocation activities on the basis of the E.I.S. which was completed by the General Services Administration for the site in the North Station Urban Renewal Project. Subsequent to the completion of the Final E.I.S. by the City, funds for clearance and public improvements could then be released by H.U.D. We believe that these procedures will permit Boston to comply with NEPA while allowing this vital project to proceed on the schedule needed by the General Services Administration. We also have discussed this procedure with the Boston Area Office of H.U.D., and they have indicated to us that they would accept any alternate procedure approved by your office.

In closing I wish to stress that the loss of the proposed Federal building would strike a critical blow to the success of the North Station Urban Renewal Plan and result in detrimental socio-economic and environmental impacts on the City. Should you have questions in regard to this request please contact Owen Donnelly, Project Manager, at (617) 722-4300 extension 209. We would greatly appreciate your timely response to our request and look forward to your affirmation of the procedures proposed herein.

Sincerely,

Kevin H. White

Kevin H. White
Mayor

Memorandum

U.S. DEPARTMENT OF
HOUSING AND URBAN DEVELOPMENT

TO: Stephen J. Bollinger, Assistant Secretary for
Community Planning and
Development, C Room 7100

DATE: NOV 5 1981

IN REPLY REFER TO:

FROM: Marvin Siflinger, Boston Area Office, 1.1S

SUBJECT: Section 108 Loan Guarantee
North Station Urban Renewal Project
Boston, Massachusetts

This memorandum is to inform you that the City of Boston has submitted a letter (copy attached) to CEQ requesting an exception to the CDBG Environmental Review procedures assumed by the Applicant under Section 104(h) of Title I of the Housing and Community Development Act of 1974. The exemption, if approved by CEQ as requested, would allow the City of Boston to submit a request to the Boston Area Office for the release of CDBG funds prior to completion of its committed EIS. The intended use of the funds would allow the City to acquire, relocate and demolish structures in a parcel of land which in turn would be conveyed to GSA for construction of a new Federal office building.

The proposed site was taken into consideration and discussed by GSA in its EIS. Also a Record of Decision issued in March of 1981 by GSA stated that this was the selected site for the new Federal office building.

The City of Boston has in the past initiated and completed several EIS's for major projects in which CDBG funding was involved. It's last EIS, Copley Place, was completed in October of 1980. It is the opinion of this office that the commitment made by the City to do an EIS will be honored.

If CEQ grants a waiver to the City of Boston to draw down funds prior to completion of EIS, no objection would be interposed by the Boston Area Office.

Edward

DEPUTY
Area Manager

Attachment

cc: 1.1S Siflinger
1.1C Paquin
1.1CM Jenkins
CCS Patch/CO
CCF Leahy/CO

CS Brown/CO
CSR Karas/CO
Owen Donnelly/City of Boston

1.1SS:MACHADO:ayl 11/5/81 ext 4121

Machado 11/5/81

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
722 JACKSON PLACE, N. W.
WASHINGTON, D. C. 20006

November 6, 1981

Honorable Kevin H. White
Mayor
City of Boston
City Hall
Boston, Massachusetts 02201

Dear Mayor White:

We have received your request for approval of expedited National Environmental Policy Act (NEPA) procedures related to the proposed Federal office building in the North Station project area in the City of Boston.

Our regulations permit a Federal agency to adopt an environmental impact statement (EIS) prepared by another Federal agency. If the action proposed by the second Federal agency is the same or substantially the same as the action described in the first EIS, the adopting agency need only circulate the EIS for a thirty day period. (See 40 CFR §1506.3 (a)(b).)

The General Services Administration has completed the EIS on the proposed construction of the Federal office building in question. It is the Council's understanding that those parties who would receive the HUD EIS are the same parties who received the GSA EIS. Rather than recirculating the EIS document to those who have already received it, the Council suggests that a letter indicating the intent to adopt GSA's EIS be sent to each party who would normally receive the EIS. Simultaneously, a notice of adoption should be placed in the Federal Register, which would trigger the commencement of the thirty day period. The adopted EIS should be sent to any person who should receive HUD's EIS, but did not receive a copy of the adopted EIS when it was circulated by GSA.

It is our understanding that standard NEPA procedures will be followed in preparing an EIS for the remaining elements of the North Urban Renewal Project.

We hope that these arrangements will prove satisfactory.

Yours truly,

Nancy Nord

Nancy Nord
General Counsel

NN/sc

cc: Mr. Richard H. Broun
Mr. Paul Cahill
Mr. Owen Donnelly ✓
Mr. Andrew Canzanelli
Mr. Edward T. Machado

publication. Any request for an administrative protective order must be made within 5 days from the date of publication. The Department will publish the final results of this administrative review including the results of its analysis of any such comments or hearing.

This administrative review and notice are in accordance with section 751(a) (1) of the Tariff Act (19 U.S.C. 1675 (a) (1)) and § 355.41 of the Commerce Regulations (19 CFR 355.41).

Melinda L. Carmen,

Acting Deputy Assistant Secretary for Import Administration.

November 20, 1981.

[FR Doc. 81-34153 Filed 11-25-81; 8:45 am]

BILLING CODE 3510-25-M

DEPARTMENT OF ENERGY

Energy Information Administration

Revision of Alternative Fuel Price Ceilings and Incremental Price Threshold for High Cost Natural Gas

The Energy Information Administration (EIA) published in the November 20, 1981 **Federal Register** (46 FR 57124) on behalf of the Federal Energy Regulatory Commission (FERC) alternative fuel price ceilings to be effective December 1, 1981. Subsequent to the publication of these price ceilings, the EIA was notified by a respondent that his original submission was in error. This error resulted in the published price ceilings for five States being too high. Revised price ceilings for these five States have been calculated based on the resubmitted data, and are listed below.

State	Dollars per million BTU's
Arkansas [1]	3.13
Louisiana	3.07
New Mexico [1]	3.13
Oklahoma [1]	3.13
Texas [1]	3.13

[1] Region based price as required by FERC Interim Rule issued on March 2, 1981, in Docket No. Rm 79-21.

These ceiling prices were calculated according to the methodology described in the November 20, 1981 **Federal Register** and are to be effective December 1, 1981. For further information contact: Leroy Brown Jr., Energy Information Administration, Federal Building, Room 4121, Washington, D.C. 20461, (202) 633-9710.

Issued in Washington, D.C., November 24, 1981.

Albert H. Linden Jr.,

Deputy Administrator, Energy Information Administration.

[FR Doc. 81-34281 Filed 11-25-81; 9:28 am]

BILLING CODE 6450-01-M

ENVIRONMENTAL PROTECTION AGENCY

[ER-FRL-1994-8]

Availability of Environmental Impact Statements

Responsible Agency: USEPA, Office of Federal Activities.

Information Contact: Ms. Kathi Wilson (202) 245-3006.

EISs Filed: November 16-20, 1981.

Comment Due Dates: Drafts—January 11, 1982. Finals—December 28, 1981.

Corps of Engineers (COE):Draft Supplement—Tennessee-Tombigee Waterway, Alabama and Mississippi; Extended Review 1/14/82 (EPA EIS #810945).

COE:Report—Pamlico Sound and Beaufort Harbor, Carteret County, North Carolina (EPA EIS #810947).

COE:Final—Big and Little Sallisaw Creeks Navigation Project, Sequoyah County, Oklahoma (EPA EIS #810949).

DOI:Bureau of Land Management:Final—1982 OCS Oil and Gas Lease Sale No. 68, Pacific Ocean and California (EPA EIS #810951).

DOT:Federal Highway Administration (FHWA):Draft—NJ-24 Freeway Completion, Morris County, New Jersey (EPA EIS #810944).

DOT:FHWA:Final—I-579/Crosstown Boulevard Construction, Allegheny County, Pennsylvania (EPA EIS #810942).

DOT:FHWA:Final—State College Bypass System/US 322 Construction, Centre County, Pennsylvania (EPA EIS #810943).

DOT:FHWA:Final—I-690/Lake Onondaga West Shore Development Northwest Arterial Connection, Onondaga County, New York (EPA EIS #810950).

Department of Housing and Urban Development (HUD):Draft—Crestview Estates Housing Development, Campbell County, Wyoming (EPA EIS #810946).

HUD:104H:Final—Federal Office Building Site Acquisition, CDBG, Boston, Suffolk County, Massachusetts: Notice of Adoption—HUD officially adopts the GSA final EIS (#800508)-30 day review period terminates on December 16, 1981 (EPA EIS #810938).

HUD:104H:Draft—City of Yonkers Waterfront Development, UDAG, Westchester County, New York (EPA EIS #810953).

HUD:Final—Applewood Village, Mortgage Insurance, Lehigh County, Pennsylvania (EPA EIS #810952).

USDA:Forest Service (FS):Draft—Washaki Wilderness Oil and Gas Exploration and Leasing, Shoshone National Forest, Hot Springs, Fremont and Park Counties, Wyoming; Extended Review 1/22/81 (EPA EIS #810939).

USDA:FS:Draft—Nebraska National Forest Land and Resource Management Plan, Nebraska and South Dakota; Extended Review 2/12/82 (EPA EIS #810941).

USDA:Soil Conservation Service:Final—Elm Creek-Watershed, Runnels and Taylor Counties, Texas (EPA EIS #810948).

Veterans Administration:Draft Supplement—San Francisco Medical Center Nursing Home Care Unit and Parking Structure, San Francisco County, California (EPA EIS #810940).

Dated: November 24, 1981.

Paul C. Cahill,

Director, Office of Federal Activities.

[FR Doc. 81-34134 Filed 11-25-81; 8:45 am]

BILLING CODE 6560-37-M

FEDERAL EMERGENCY MANAGEMENT AGENCY

[Docket No. FEMA-REP-4-SC-2]

The South Carolina Radiological Emergency Response Plan For the V. C. Summer Nuclear Power Plant

AGENCY: Federal Emergency Management Agency.

ACTION: Certification of Federal Emergency Management Agency findings and determination.

In accordance with FEMA Rule 44 CFR 350 (proposed), on June 4, 1980, the State of South Carolina submitted its emergency response plans relating to the V. C. Summer Nuclear Power Plant to the Regional Director who forwarded his evaluations to the Acting Associate Director of State and Local Programs and Support, in accordance with § 350.11 of the proposed rule. The evaluations considered the contiguous State and local plans involved in the 10- and 50-mile emergency planning zones (EPZs), a critique of the exercise conducted on May 1, 1981, in accordance with § 350.9, and a report of the public meeting held on April 30, 1981, to discuss the site specific aspects of the State and local plans in accordance with § 350.10 of the proposed rule.

Part II SUMMARY

Part II - SUMMARY

A. Brief Description of Project and Project Area

The proposed project involves the redevelopment of the last major undeveloped section in Downtown Boston. Lying between Leverett Circle and the new Charles River Dam, the project area encompasses approximately 49 acres of land and water and is bounded generally by Causeway Street, Lomasney Way, Martha Road, the old Charles River Dam, the Charles River, and Accolon Way. The site contains a mixture of commercial, residential, office, institutional, and entertainment uses, but the majority of the area is given over to transportation related uses (railroad tracks, surface parking lots, the Green Line elevated tracks, local streets and expressway connector ramps). Major landmarks include North Station and Boston Garden, the Registry Building, and the Massachusetts Rehabilitation Hospital.

The proposed Urban Renewal Plan outlines a development strategy for the North Station area. Combining public and private investment opportunities, the Plan entails extensive transportation improvements, increased commercial and retail activity, and a more innovative riverfront development, principally through the creation of an island in the Charles River for 1,100 new housing units. A major catalyst for the redevelopment of the North Station area is the location of a new GSA Federal Office Building in the area.

Major components of the redevelopment plan include the following:

(1) Construction of a new sports arena behind the existing Boston Garden/North Station complex.

(2) Construction of major office and commercial uses totalling 1,200,000 sq.ft. (including the Federal Office Building) in the Billerica Street area and between North Station and the Expressway ramps to Storrow Drive, together with 1,500 garaged parking spaces to replace existing surface lots.

(3) Construction of new residential, park, and hotel uses on air rights over the rail yards and along the river's edge, including a waterfront promenade fronted by shops and a 400-room hotel, provision of 2,200 garaged parking spaces, and creation of an island in the Charles River containing 1,100 dwelling units and public/museum space.

(4) Removal of the Green Line elevated structure on Causeway Street and the construction of replacement transit service between Haymarket Station and Science Park Station.

(5) Circulation improvements, including the widening of Merrimac Street, Lomasney Way, and Martha Road to provide a direct connection between Haymarket Square and Leverett Circle, the provision of an internal circulation system, and improved pedestrian walkways.

B. Federal and State Identification Numbers

HUD-R01-EIS-83-01-F
EOEA #03728

C. Project Proponent/Lead Agency

Boston Redevelopment Authority (City of Boston)

D. EIR/EIS Status

Final Environmental Impact Report/Environmental Impact Statement

E. Alternatives Considered

1. No-Build Alternative

   Continuation of existing uses, renovation of Boston Garden/North Station complex to improve efficiency and attractiveness, and reuse of Registry Building for office use.

2. Project Development Alternatives

   - Optional schemes for new arena construction and redevelopment options for reuse of the Boston Garden site.
   - Reduced scale development of the Phase II development area, emphasizing maintenance of existing facilities and increased riverfront parkland development.

3. Transportation Alternatives

   - Alternative locations and options for replacement of the existing Green Line elevated within the project area.
   - Options for commuter rail improvements at North Station.
   - Options for relocation of Storrow Drive/Central Artery Connector ramps.
   - Depression of the Central Artery and relocation of connections to Leverett Circle.

F. Summary of Major Benefits, Costs, and Environmental Impacts of the Project and Its Alternatives

The major benefits of the proposed Urban Renewal project include:

1. the removal of the blighting influence of the Green Line elevated;
2. the provision of an integrated, mixed-use development of office, retail, residential, hotel, and public activities to upgrade a major undeveloped section of downtown Boston;

3. the provision of an improved circulation system for both vehicles and pedestrians;

4. the aesthetic enhancement of the Charles River shoreline;

5. the replacement of the Boston Garden arena; and

6. the development of the riverfront area for public use and enjoyment.

The major environmental impacts of the proposed project include:

1. an increase in project area traffic leading to reduced levels of service at major intersections or a maintenance of existing unsatisfactory conditions;

2. slightly higher carbon monoxide levels when compared to a no-build condition, and only one exceedence of standards, in 1987;

3. significant increases in short-term NO_2 levels from ventilation exhaust vents required due to covering of the commuter rail tracks;

4. future noise levels within 1 dB of existing levels (imperceptable change) and a noticeable reduction projected at one receptor;

5. improvements in water quality of the Charles River from on-going MDC pollution control and CSO projects;

6. potential hydrological impacts from the construction of a canal and creation of an island in the Charles;

7. significantly improved public access to the riverfront;

8. increases in water consumption and energy use and in sewerage and solid waste generation; and

9. development plan conflicts with major combined sewer overflow conduits and outfalls, requiring their relocation, and with proposed future highway improvements at Leverett Circle.

FEDERAL, STATE, AND LOCAL AGENCIES AND INDIVIDUALS FROM WHICH COMMENTS ARE REQUESTED

Federal Agencies

Environmental Protection Agency
Council on Environmental Quality
Department of Housing and Urban Development
Advisory Council on Historic Preservation
General Services Administration
Department of Commerce/Economic Development Administration
Department of the Interior
Department of Transportation
Federal Highway Administration
Urban Mass Transportation Administration
U.S. Army Corps of Engineers

State Agencies

Executive Office of Environmental Affairs
Executive Office of Communities and Development (State Clearinghouse)
Metropolitan Area Planning Council (Regional Clearinghouse)
Department of Community Affairs
Department of Commerce and Development
Executive Office of Transportation and Construction
Department of Public Works
Department of Environmental Quality Engineering
DEQE - Division of Air Quality Control
Office of Coastal Zone Management
Metropolitan District Commission
Massachusetts Historical Commission
Massachusetts Bay Transportation Authority
Massachusetts Aeronautics Commission
Executive Office of Public Safety
The Adjutant General's Office

Local Agencies

Office of the Mayor, City of Boston
Boston City Council
Boston Conservation Commission
Boston Air Pollution Control Commission
Boston Landmarks Commission
City of Boston Traffic and Parking Department
City of Boston Public Works Department
Boston Water and Sewer Commission

Individuals and Organizations

Hon. Sal DiMasi, Representative, 3rd Suffolk District
Mr. Efrem Weinreb, President, Downtown North Association
Mr. Sumner Edelstein, President, North Station Advisory Corp./Charles River Park

Individuals and Organizations (continued)

Mr. Burgess Standley, Director of Planning, Massachusetts General Hospital
Mr. Paul Mooney, President, New Boston Garden Corp.
Mr. Peter Brown, Downtown North Association
Mr. Paul Mannos, President, Dison Corporation
Mr. Sam Crissafulli, North Station Advisory Corp.
Mr. Tom Chestnut, Digital Equipment Corporation
Charles River Watershed Association
Conservation Law Foundation

Part III DESCRIPTION OF THE PROJECT

Part III DESCRIPTION OF THE PROJECT

A. Type of Project

The actions for which this Final Environmental Impact Report/Environmental Impact Statement has been prepared are two-fold:

1) the approval, by the Massachusetts Department of Community Affairs (DCA), of an Urban Renewal Plan for the redevelopment of the North Station area in the City of Boston, proposed by the Boston Redevelopment Authority (BRA), in accordance with Chapter 121B of the Massachusetts General Laws. This approval was granted on January 19, 1981, following the submission of an Interim Environmental Impact Report on August 28, 1980, pursuant to the "Specific Procedure" established for this project by the Secretary of Environmental Affairs (see Part I supra).

2) the approval, by the U.S. Department of Housing and Urban Development (HUD), of an application by the City of Boston for a Community Development Block Grant loan guarantee of $6,250,400 under Section 108 of the Housing and Community Development Act of 1974, as amended, in order to assist in the implementation of Phase I of the renewal project. This application, in the form of an amendment to the HUD-approved Year VI CDBG application, was approved on September 30, 1981, following compliance with alternate NEPA procedures approved by the Council on Environmental Quality (CEQ) (see Part I supra).

The proposed urban renewal project at North Station calls for a mixed-use development focused around the reconstruction of the Boston Garden sports arena complex and the construction of a new Federal Office Building within the project boundaries. The proposed land uses include office and retail space, parking structures, a waterfront hotel and residential development and a major public-use facility. Public improvements include the removal and replacement of the existing Green Line elevated structure and the construction of improved and widened streets for through-traffic circulation. Also proposed (conceptually) is an upgraded riverfront through the creation of a canal and island in the Charles River with continuation of Esplanade activities along public open spaces.

Several State and Federal agencies are and will be involved in the implementation of specific aspects of this renewal project:

1) The U.S. General Services Administration (GSA) will be responsible for the construction and operation of the new Federal Office Building. A Final EIS on this project was published by the GSA on July 9, 1980, and was reviewed by the Massachusetts Executive Office of Environmental Affairs (EOEA) as part of the North Station Urban Renewal Project. This EIS also was adopted by the City of Boston, with the approval of the Council on Environmental Quality, to facilitate the release of HUD Section 108 funds to initiate project activities related to the GSA development.

2) The Massachusetts Bay Transportation Authority (MBTA), with financial assistance to be provided by the Urban Mass Transportation Administration (UMTA) of the U.S. Department of Transportation (DOT), will be responsible for the relocation of the Green Line rapid transit line and commuter rail improvements in the North Station area. A Draft EIR/EIS for the Green Line Relocation was published on July 27, 1982, and similarly was submitted to EOEA to be reviewed as part of the urban renewal project.

3) Funding under the Urban Systems Program may be requested by the City from the Federal Highway Administration (FHWA) to assist in the construction of the roadway and circulation improvements in the project area.

4) The Massachusetts Department of Public Works (DPW) may, at some future date, request financial assistance from FHWA to undertake improvements to the Central Artery/Storrow Drive Connector and Leverett Circle, as well as for the depression of the Central Artery and relocated connectors to Leverett Circle.

5) Funding also may be sought from the Department of the Interior (DOI) for the construction of urban parkland within the project area.

6) Permits would be required from the U.S. Army Corp of Engineers and from the Massachusetts Department of Environmental Quality Engineering (Divisions of Water Pollution Control, Land and Water Use, and Hazardous Wastes) for the construction of the proposed canal and mid-river island in Sub-area II.

7) Additional funding from the U.S. Department of Housing and Urban Development (HUD) under the Community Development Block Grant and Urban Development Action Grant programs and assistance under the agency's various housing programs may be required in order to complete the renewal plan proposals.

B. Project Background

In 1977, a concerted effort between the Boston Redevelopment Authority and the Downtown North Association resulted in the publication of a planning study, New Directions for North Station, (1) which discussed, in addition to the project area, the Bulfinch Triangle, a commercial/wholesale/office district to the south of Causeway Street. The plan proposed immediate, mid-term and long-term programs of new development and rehabilitation in the Bulfinch Triangle and redevelopment to the north of Causeway Street. Public investment in major infrastructure improvements also was proposed.

Continued work with the Downtown North Association led to the retention of the architectural firm of Moshe Safdie and Associates as a consultant to the Authority and the subsequent development and publication, in the fall of 1979, of a more detailed planning and development program for the North Station Area. This report, A Development Plan for: North Station District, (2) placed special emphasis on the need for the immediate relocation of the Green Line elevated, the revitalization of existing business concerns in the Bulfinch Triangle area, and a major redevelopment of the waterfront area north of the North Station/Boston Garden complex.

The principal impetus for achieving this plan was the offer, by the City of Boston, of a major development site for a proposed new Federal Office Building in Boston, adjacent to the Boston Garden and Causeway Street. In January, 1980, the City and the BRA made a proposal to the General Services Administration to provide the site and to pursue a city-funded urban renewal plan to insure its implementation. The GSA stated its interest in this site provided the City could commit itself to a site delivery schedule consistent with GSA's development program. Subsequently, the City prepared an Urban Renewal Plan for the North Station area, which was approved by the Commonwealth in January of 1981, and the GSA formally selected the North Station site for the new Federal Office Building in November, 1981.

C. Project Area Description

The North Station Urban Renewal Project Area is the last major under-utilized area in downtown Boston, located between Leverett Circle and the new Charles River Dam and adjacent to the West End and Government Center urban renewal projects (Figures III-1 - III-5). The Charles River and major arterial streets form the principal boundaries of the project area. The northern boundary of the project is the center-line of the Charles River; the eastern boundary follows the property line of the MDC (new) Charles River Dam and continues along the edge of the Annelex Building (Accolon Way); the southern boundary follows Causeway street; and the western boundary lies along the mid-line of Lomasney Way and the westerly edge of Martha Road, contiguous with the boundary of the West End Urban Renewal Project, to the old Charles River Dam (Figure III-3). The total project area encompasses 49.6 acres, of which 42.4 acres are land and approximately 7.2 acres are included in the Charles River.

For purposes of redevelopment strategy, the project area has been divided into two sub-areas (Figure III-3). Sub-area I, where immediate development is expected to occur, includes approximately 13.7 acres and is located between Causeway Street and the Fitzgerald Expressway off-ramp to Storrow Drive. Sub-area I contains the North Station/Boston Garden complex - the concourse for the MBTA North Station commuter rail line and the auditorium of the Boston Garden, the vacant Madison Hotel, mixed residential and commercial uses in one- to four-story buildings and small surface parking lots in a four-block area along Billerica Street, and large surface parking lots behind North Station and the Madison Hotel.

Sub-area II encompasses approximately 35.9 acres of land and water north of the Expressway off-ramp and is the area for longer-range development. Predominant land uses in this sub-area include several parking lots (the largest of which are owned and used by the Massachusetts General Hospital (MGH) and the Commonwealth of Massachusetts (MDC and DPW)), the Massachusetts Registry of Motor Vehicles building, the Massachusetts Rehabilitation Hospital, the MBTA rail yards and track area serving the North Station,

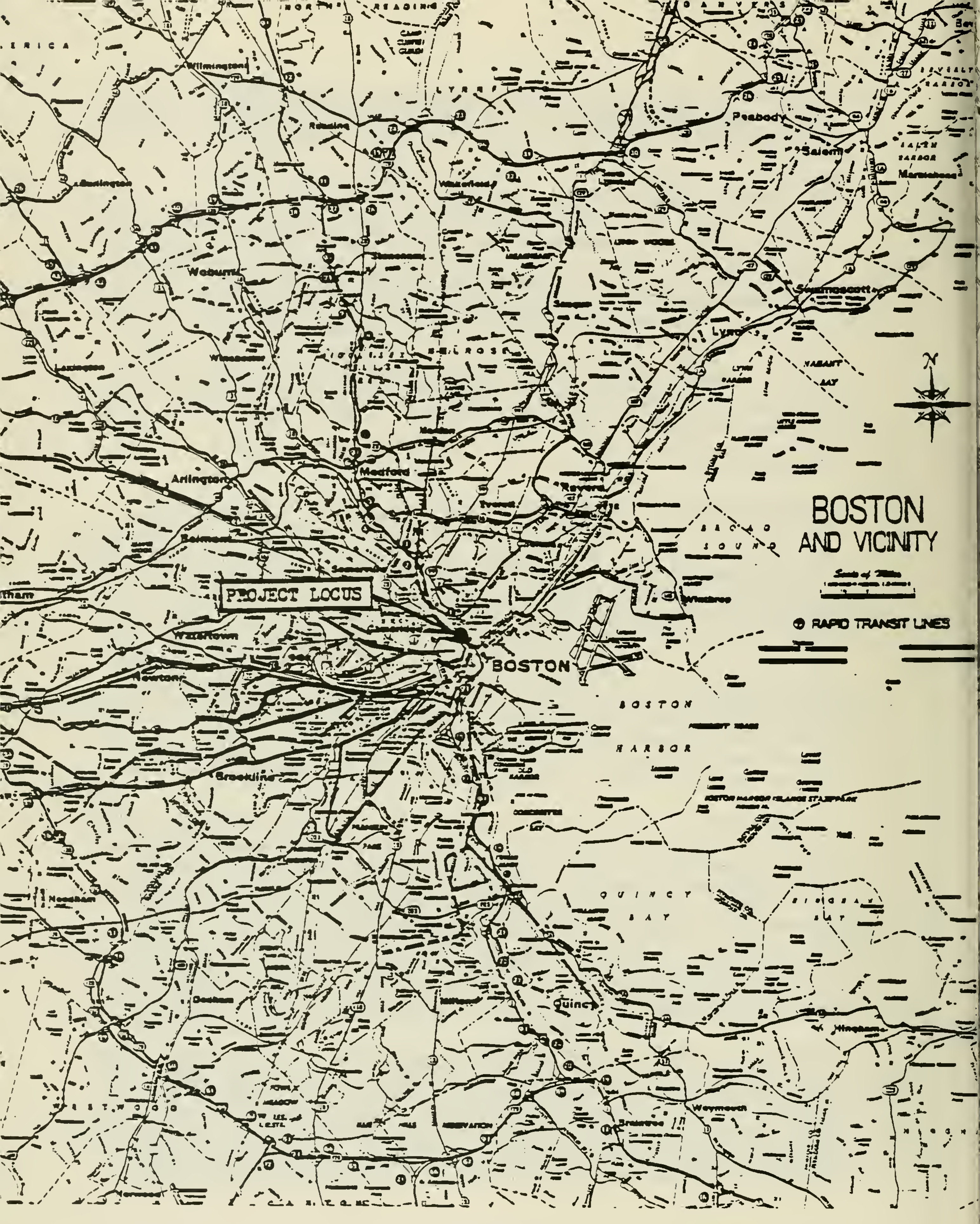


Figure III-1: NORTH STATION URBAN RENEWAL PROJECT - Regional Location

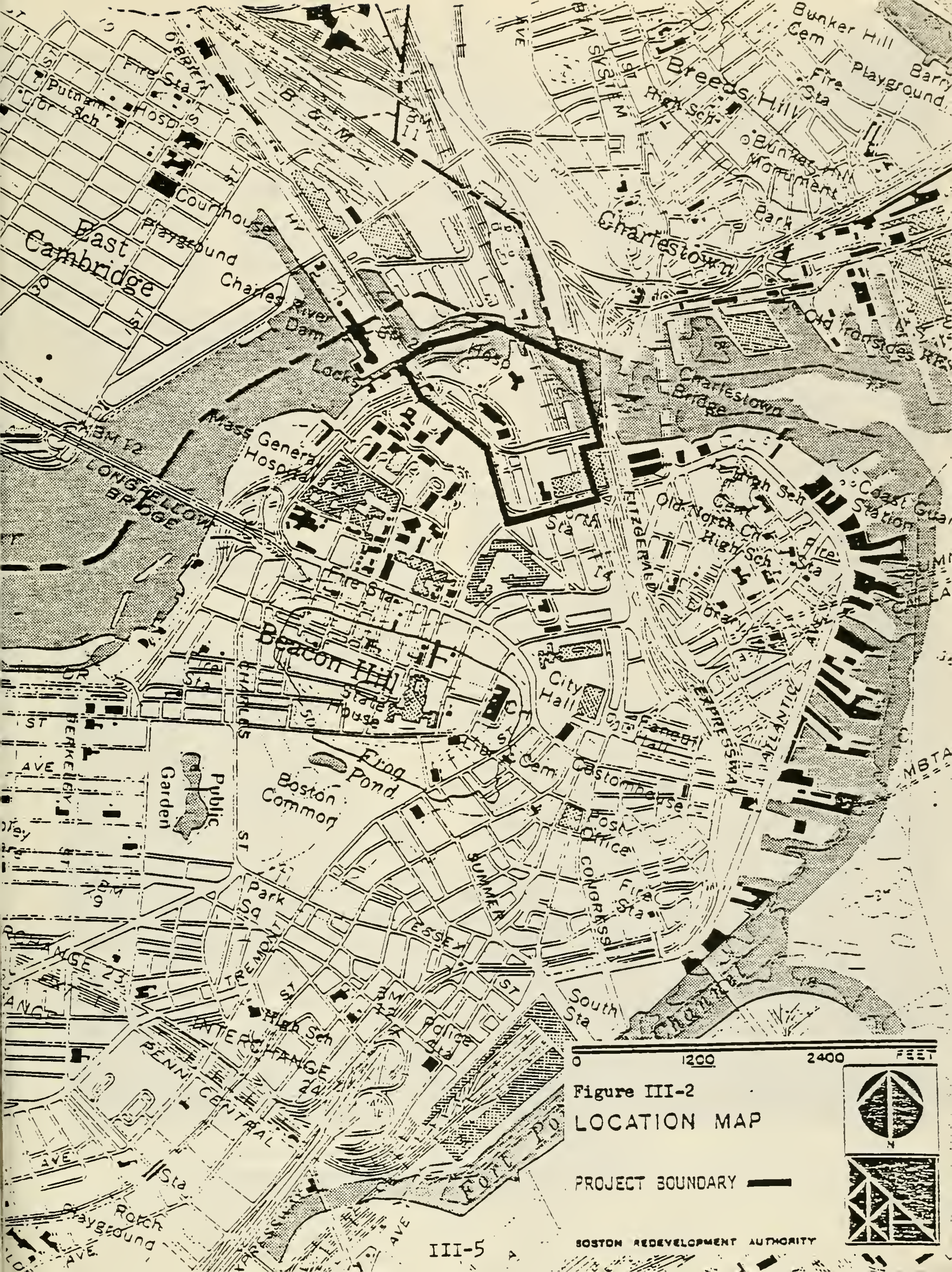


Figure III-2
LOCATION MAP

PROJECT BOUNDARY ▬

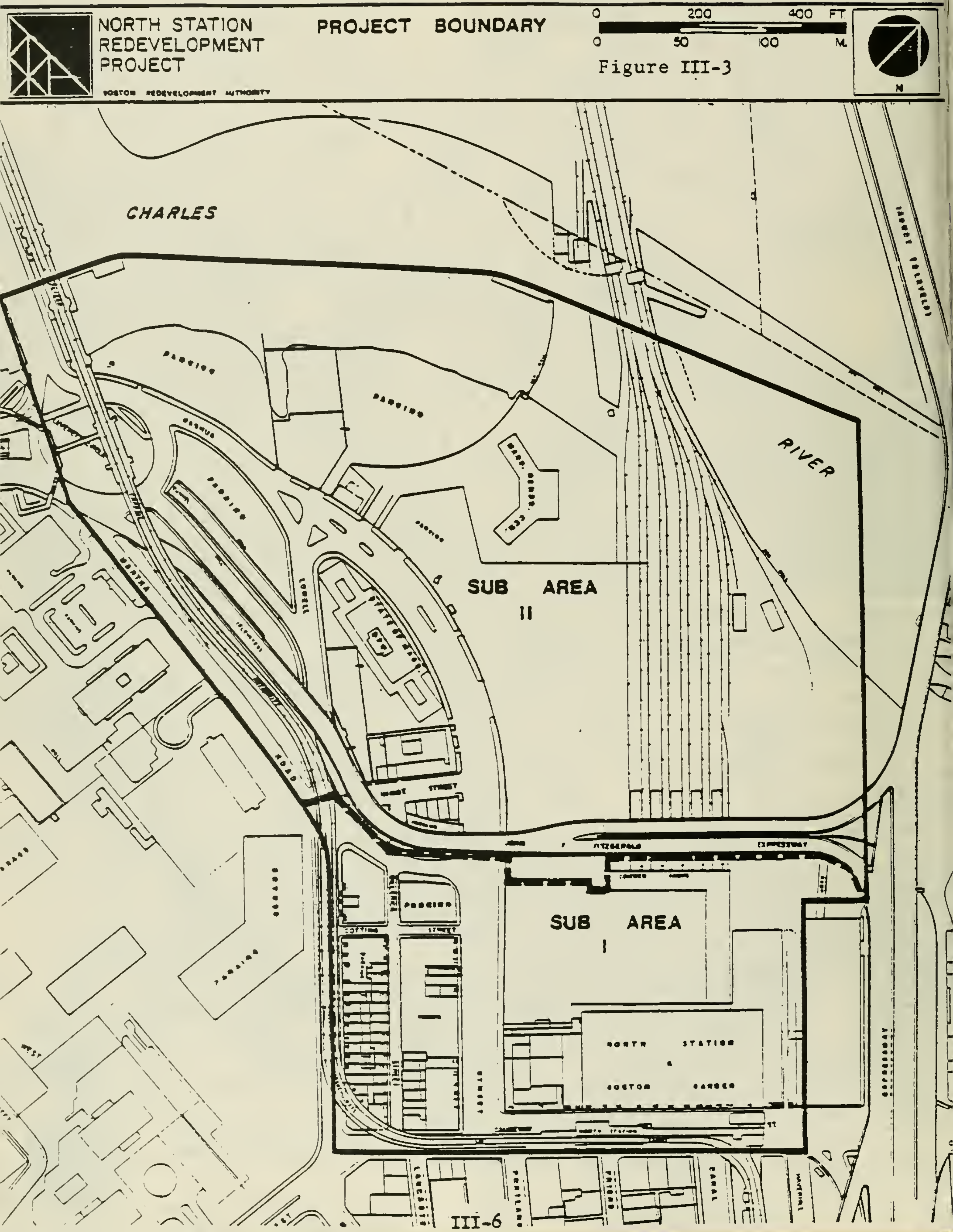
BOSTON REDEVELOPMENT AUTHORITY

NORTH STATION
REDEVELOPMENT
PROJECT

BOSTON REDEVELOPMENT AUTHORITY

PROJECT BOUNDARY

Figure III-3



Boston Magazine

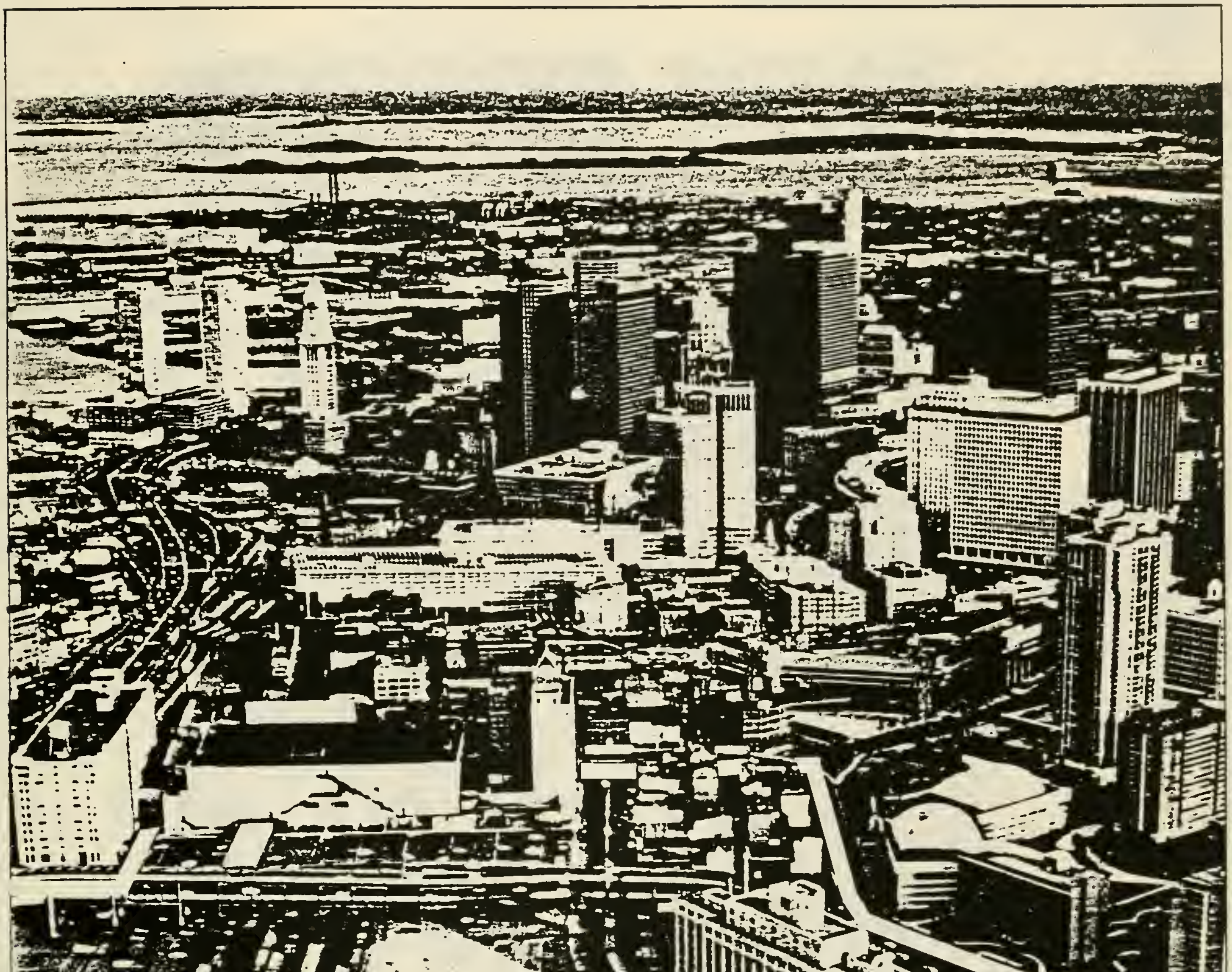


Figure III-4(a): NORTH STATION PROJECT AREA - AERIAL VIEW

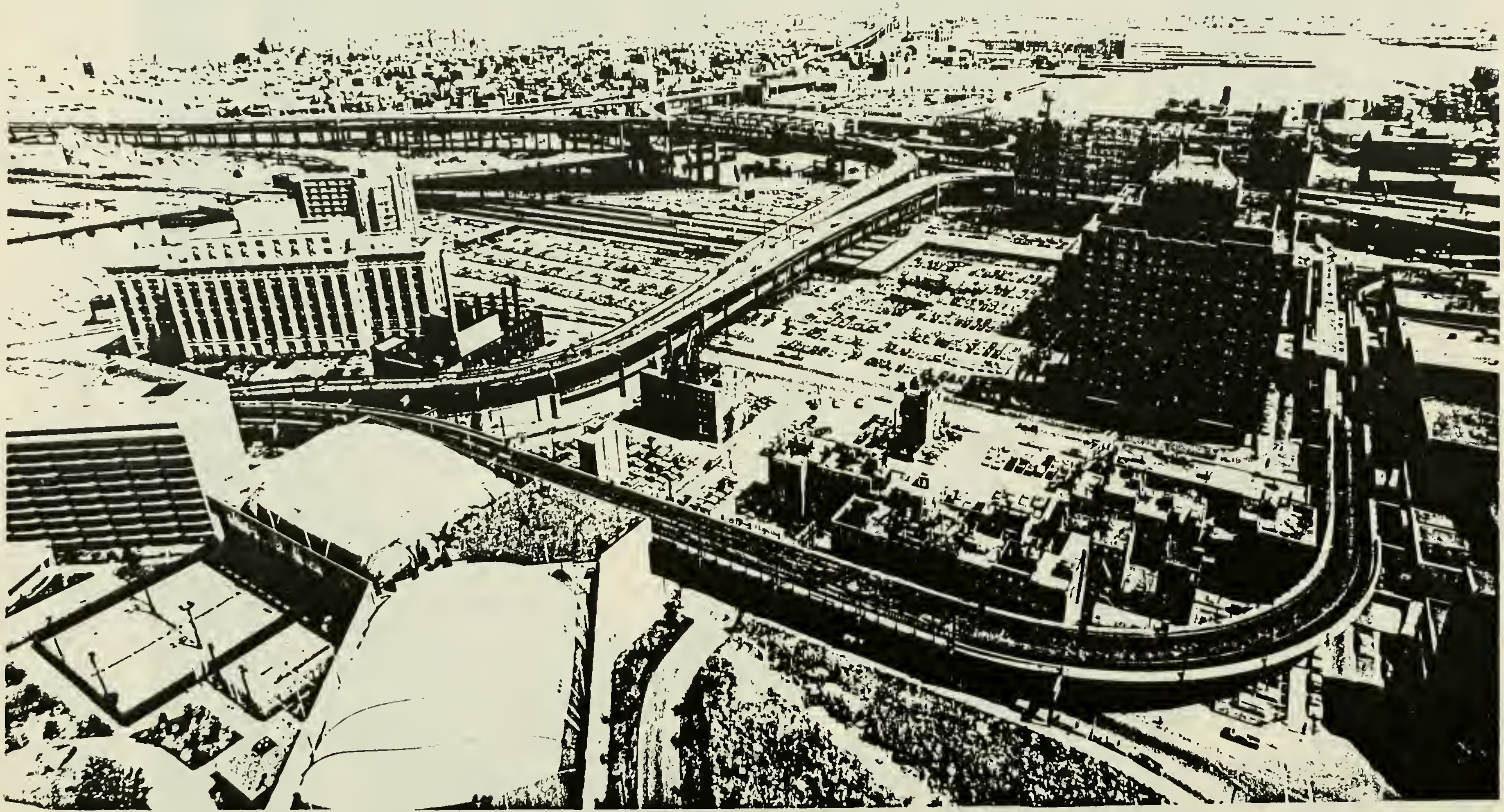
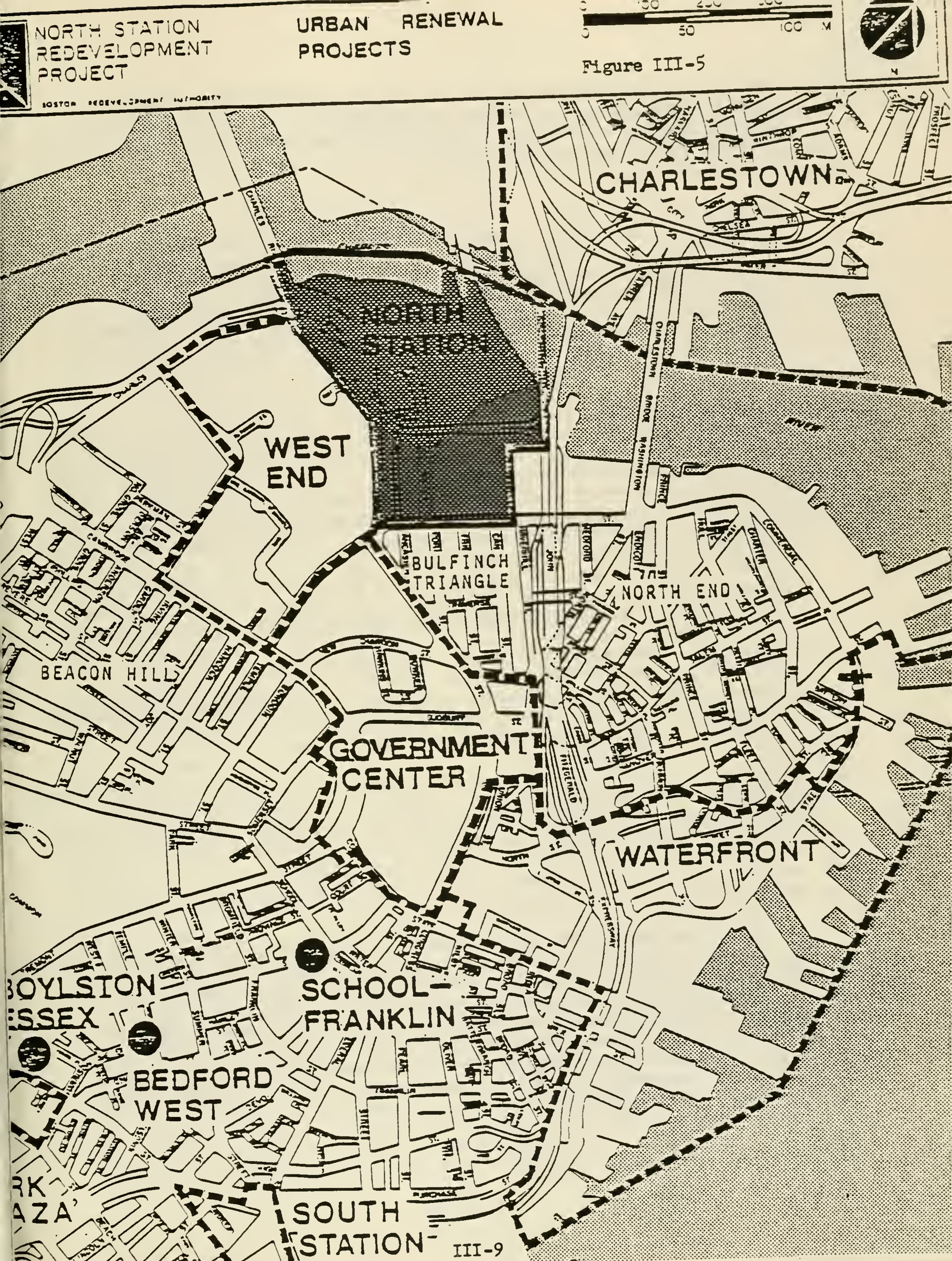


Figure III-4(b): AERIAL VIEW OF NORTH STATION PROJECT AREA


NORTH STATION
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PROJECT
BOSTON REDEVELOPMENT AUTHORITY
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WEST
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BULFINCH
TRIANGLE
NORTH END
BEACON HILL
GOVERNMENT
CENTER
WATERFRONT
BOYLSTON
ESSEX
SCHOOL-
FRANKLIN
BEDFORD
WEST
RK
AZA'
SOUTH
STATION

Figure III-5

and two utility buildings (one owned by Boston Edison which provides steam pressure primarily to MGH and the other containing a transformer to provide electrical services to the North Shore commuter service). A DPW parking lot adjacent to the Charles River also contains a helicoptor landing pad.

The districts surrounding the project area are primarily residential and commercial in character. Immediately to the west is the West End renewal project area, consisting of 2,136 luxury residential units located in the Charles River Park and Longfellow Towers developments and 326 subsidized units in the Amy Lowell and Blackstone elderly projects, as well as office and retail spaces, parking, and institutional uses. To complete the West End development, the renewal plan calls for the development of additional residential and ancillary commercial space at the corner of Lomasney Way and Staniford Street.

To the south of the project area is the Bulfinch Triangle area - bounded by Causeway, Canal, and Merrimac Streets - a commercial district of 4- to 8-story brick structures. Wholesale furniture, home furnishings, office, and entertainment uses predominate. Much of the building stock is underutilized, and several adult entertainment uses and fast food restaurants are located across Causeway Street from the Boston Garden. This area is currently in the process of being upgraded. The City of Boston has spent some $200,000 on pedestrian improvements to Canal Street, and various private developers are now purchasing and renovating structures for various commercial purposes, including office space and artists' lofts. This renovation activity reflects the tight supply of available commercial and residential space in and around the Boston CBD. The presence of the Green Line elevated, on the other hand, continues to be a blighting influence on the northern perimeter of the triangle area along Causeway Street. Other negative influences are the frequent congestion on Causeway Street and the mixture of local and through traffic on the same routes to gain access to the Central Artery from local streets.

Southwest of the North Station and Bulfinch Triangle areas is the Government Center Urban Renewal Project Area, a major governmental office center containing the Boston City Hall, the J.F. Kennedy Federal Office Building, and State office buildings, as well as several private office buildings and commercial establishments. Immediately adjacent to the North Station project, at the corner of Merrimac and Staniford Streets, is the State Service Building.

The North End lies to the southeast of the project area and comprises one of the most physically and socially close-knit residential neighborhoods in downtown Boston. Four- to six-story brick buildings predominate in a very tight building and street pattern. Vehicular traffic on North Washington Street acts as a barrier for pedestrian activity to North Station, with Causeway Street as the only main connector between the two areas. In recent years, the North End has begun to be upgraded through private investment in residential and commercial rehabilitation and some new housing construction.

To the north, directly across the river from North Station, lie railyards and a variety of industrial and storage uses in the City of Cambridge. The Museum of Science stretches across the river along the old Charles River Dam to the northwest, while the Charlestown residential community is located to the northeast, separated from the North Station area by the I-93/Tobin Bridge connector ramps.

D. Detailed Project Description

The redevelopment plan for the North Station area, prepared for the BRA by Moshe Safdie, proposes an intense mix of commercial, residential, and institutional uses to revitalize a section of downtown Boston which at present is largely vacant or underutilized (Figure III-6). Combining public and private investment opportunities, the Plan entails extensive transportation improvements, increased commercial and retail activity, and an innovative riverfront development, principally through the creation of an island in the Charles River for residential use (Figures III-7, III-8). The development is proposed to be accomplished in two phases, the first within the next 5-7 years and the second within 8-15 years. Accordingly, the project area has been sub-divided into two sub-areas corresponding to this two-phase development, although certain transportation elements of the Plan, as noted below, will extend through both sub-areas. A summary of the total development program is as follows:

Table III-1

North Station Redevelopment Program

Use	Sub-Area I	Sub-Area II	Total Area
Retail/Commercial	125,000 sq.ft.	90,000 sq.ft.	215,000 sq.ft.
Office	1,200,000 sq.ft.	-	1,200,000 sq.ft.
Luxury Hotel	-	400 rooms	400 rooms
Residential	-	1,100 units	1,100 units
Arena	16,800 seats		16,800 seats
Public/Museum	-	115,000 sq.ft.	115,000 sq.ft.
Public Open Space	80,000	240,000 sq.ft.	320,000 sq.ft.
Parking	1,500 spaces	2,200 spaces	3,700 spaces

Sub-Area I - (North Station/Boston Garden Complex - Billerica Street)

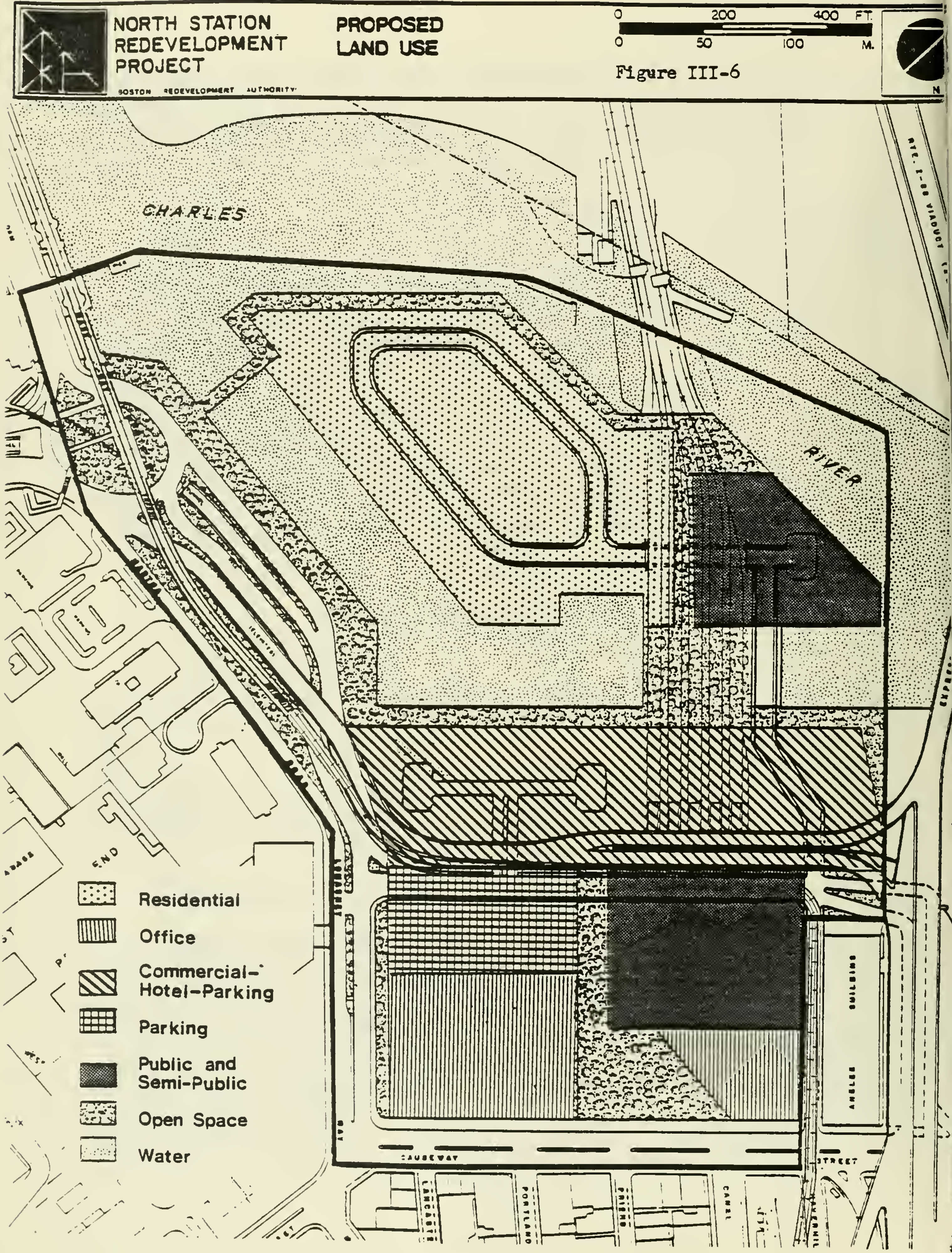
Within Sub-area I, a major office and commercial development, totalling 1,325,000 square feet, is proposed in the Billerica Street area and on the site of the North Station/Boston Garden complex (Figure III-9). Included in this development is a 105,000 square foot site for the proposed 800,000 square foot (gross) Federal Office Building, located generally between Lomasney Way and the Boston Garden and including the vacant Madison Hotel parcel. Behind the existing North Station/Boston Garden complex would be constructed a new sports arena on a 121,000 square foot site, to accommodate a maximum of 17,300 persons. Included in the lower level of the arena would be a 500-car garage and a new North Station commuter rail concourse. Between the Expressway ramps and the GSA Building is proposed a parking garage for 1,000 cars, replacing the existing surface parking lots which accommodate 605 cars. Also included

NORTH STATION
REDEVELOPMENT
PROJECT

BOSTON REDEVELOPMENT AUTHORITY

**PROPOSED
LAND USE**

Figure III-6



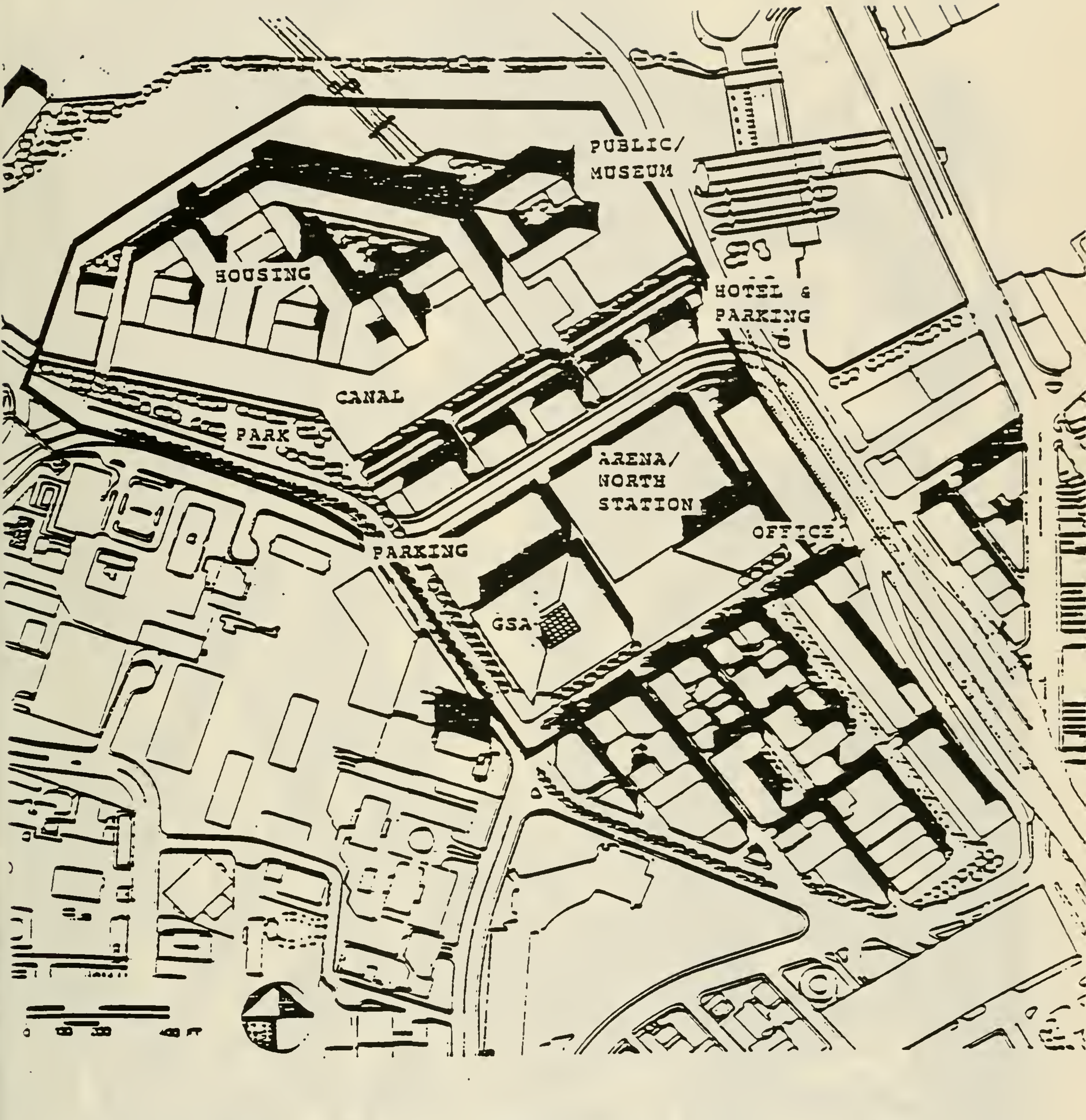


Figure III-7: SITE PLAN - PREFERRED DEVELOPMENT PROGRAM NORTH STATION URBAN RENEWAL PROJECT

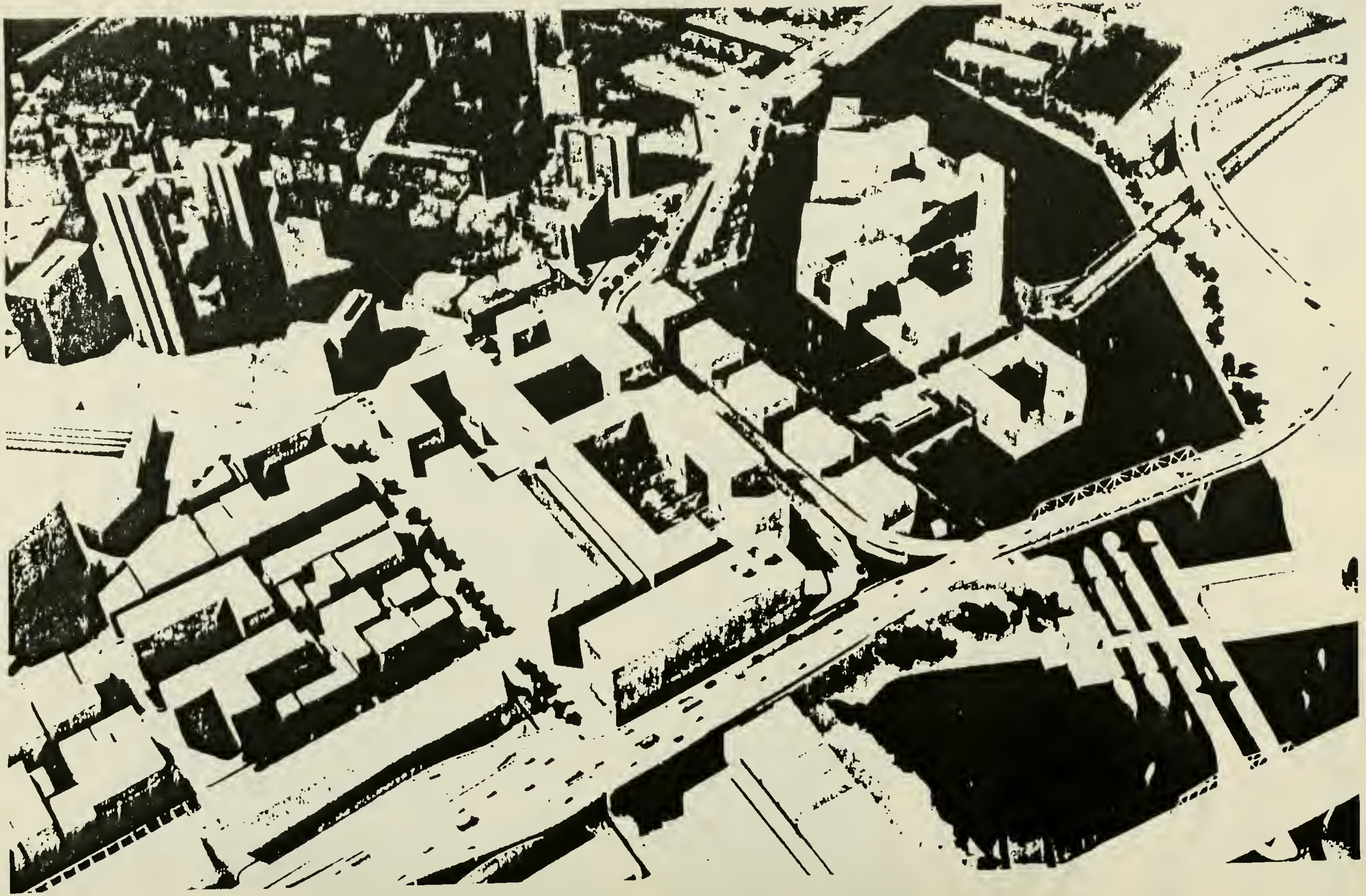


Figure III-8(a): PHOTOGRAPH OF NORTH STATION DEVELOPMENT MODEL (PREFERRED PROGRAM)

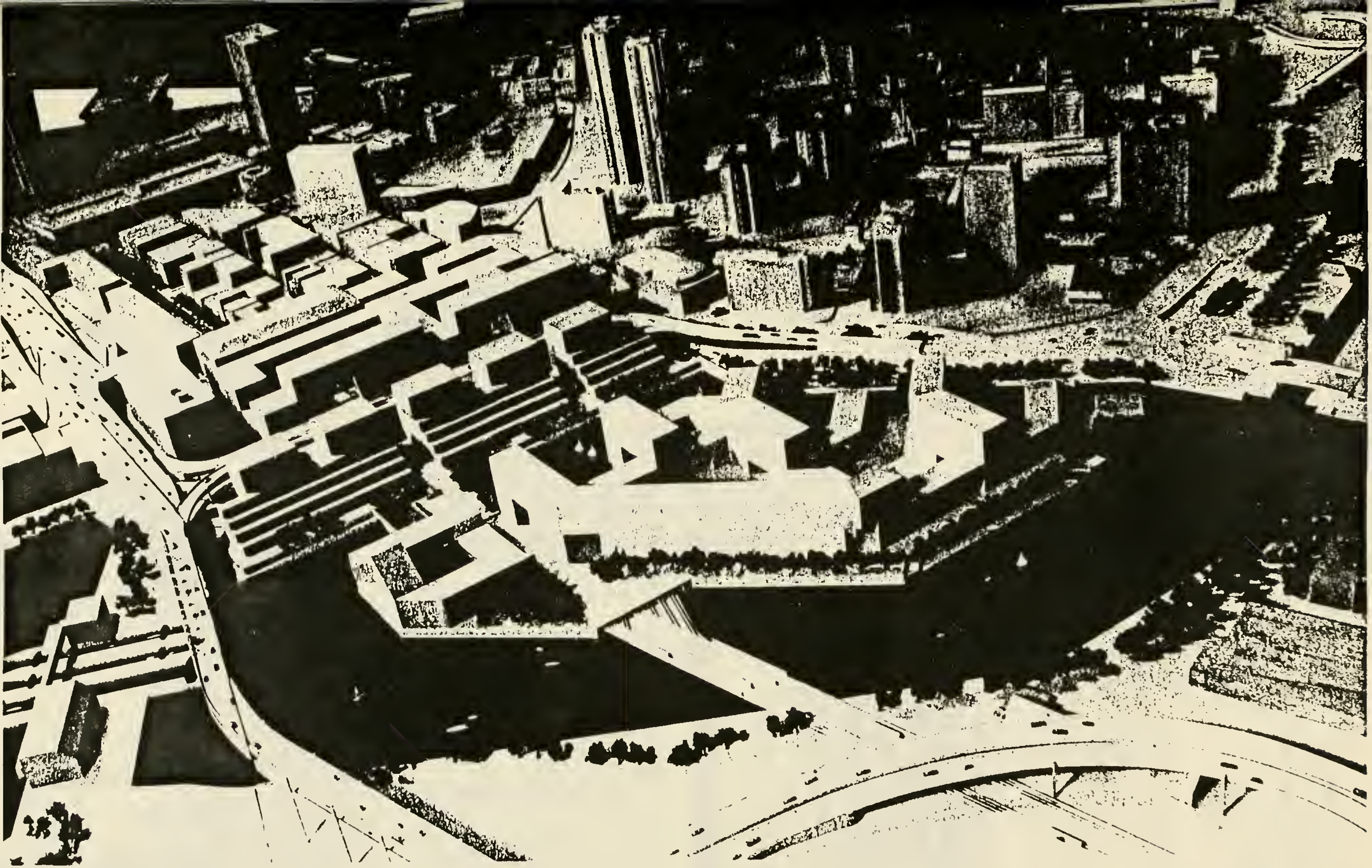


Figure III-8(b): PHOTOGRAPH OF NORTH STATION DEVELOPMENT MODEL (PREFERRED PLAN)

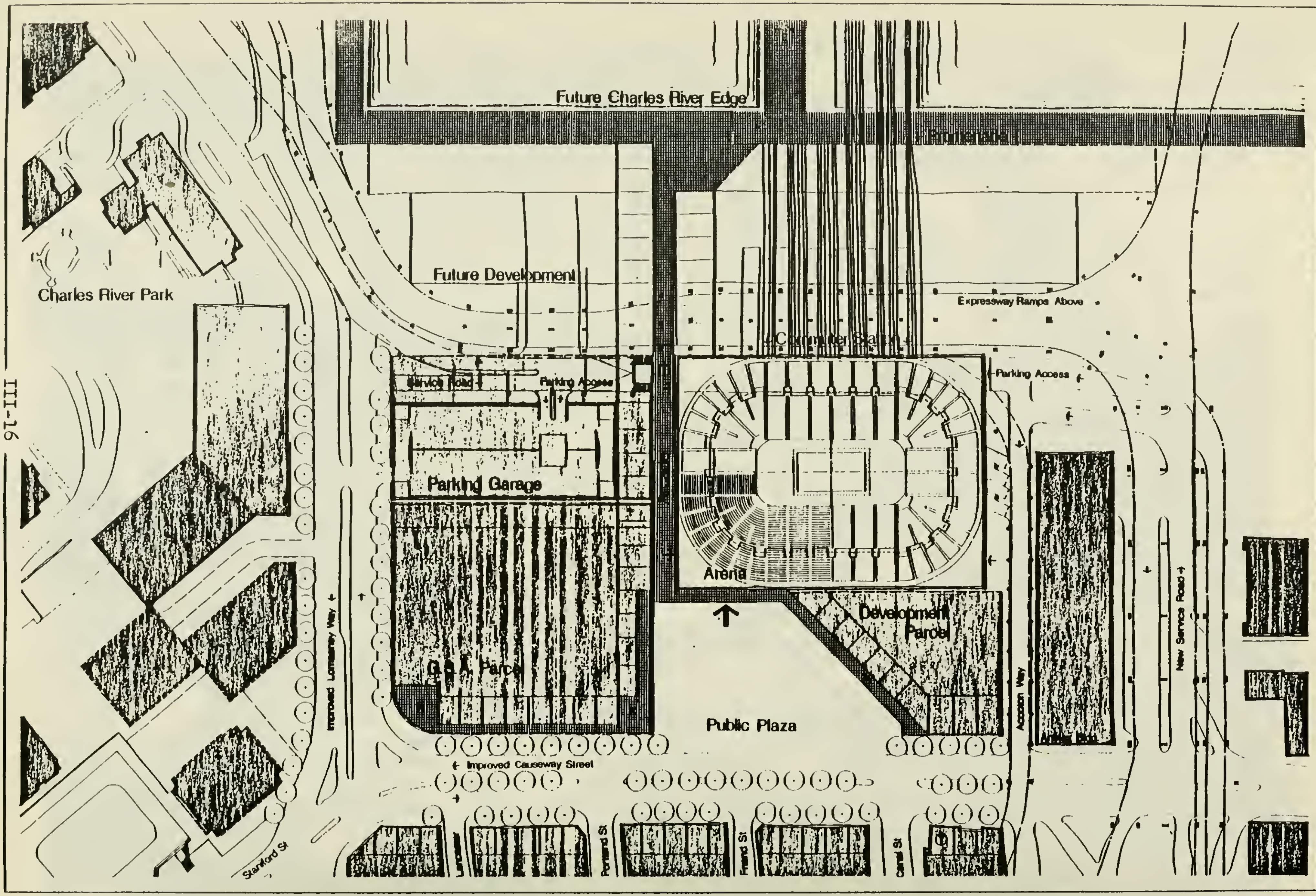


Figure III-9: NORTH STATION REDEVELOPMENT - PHASE I: SITE PLAN

in the Phase I development, following construction of the new arena, is the demolition of the North Station/Boston Garden building and redevelopment of the site with an 80,000 square foot public plaza and a 400,000 square foot office building on Causeway Street. Retail and commercial uses would be located at street level and along pedestrian walkways, 24,500 square feet (gross) of which would be located in the Federal Office Building.

The new Federal Office Building, designed by Hugh Stubbins and Associates, Inc. (Figure III-10), will contain approximately 640,000 net usable square feet to accommodate an estimated 2,900 persons - 2,738 employees of 26 government agencies and approximately 160 building support personnel. In addition to agency office and support space, the building program includes 22,050 net square feet of "outlease" space accessible to the general public and 100,000 square feet of below-grade secured parking for an estimated 267 cars.

The new arena (Figures III-11, III-12)is proposed as a 295 feet by 410 feet structure with a capacity of 16,000 persons for hockey and 16,800 for basketball (in addition, 60 VIP boxes would add approximately 500 to the capacity of each event). The arena itself would be raised approximately 30 feet from the ground, the space beneath to accommodate the two-level parking garage for 500 cars and the improved MBTA commuter rail station. The 1,000-car parking facility between the GSA Building and the Expressway ramps, proposed in conjunction with the new arena, is tentatively planned as a seven-level structure. The proposed office building at Causeway Street and Accolon Way, on the site of the present North Station/Boston Garden complex, would be a mid-rise building with a maximum height of 20 stories.

Sub-Area II - (River Area)

New residential, park, and hotel uses are envisioned by the Plan in the area comprising the rail yards and parking lots north of the expressway ramps and along the river's edge. The focal point of the redevelopment proposal is the building of a canal along the alignment of the present Nashua Street and parallel to the expressway ramps to create an island in the Charles River. The island would contain 1,100 dwelling units built over an 1,100-car garage, with a combination of open courts, landscaping, and water orientation suggesting an island environment similar to the Isle St. Louis in Paris. The eastern end of the Island, facing the new Charles River Dam, would be reserved for an important public building or museum, and service stores and restaurants would be concentrated opposite the public building and on the Island's western edge facing the boat canal.

On the southern side of the canal are proposed a 400-room hotel and shops built over an 1,100 car parking garage (replacing 1,727 surface parking spaces) and fronting a waterfront promenade. This promenade continues a linear river park which connects the Esplanade park system to the new Charles River Dam and a proposed Freedom Trail Spur to Charlestown and joins the north-south pedestrianway to the Island and to the Sub-area I development. Public access to the Charles is thus assured. Internal vehicular circulation would be located under the development. The commuter trains continue in the existing right-of-way on grade, with all pedestrian activities situated above the tracks.

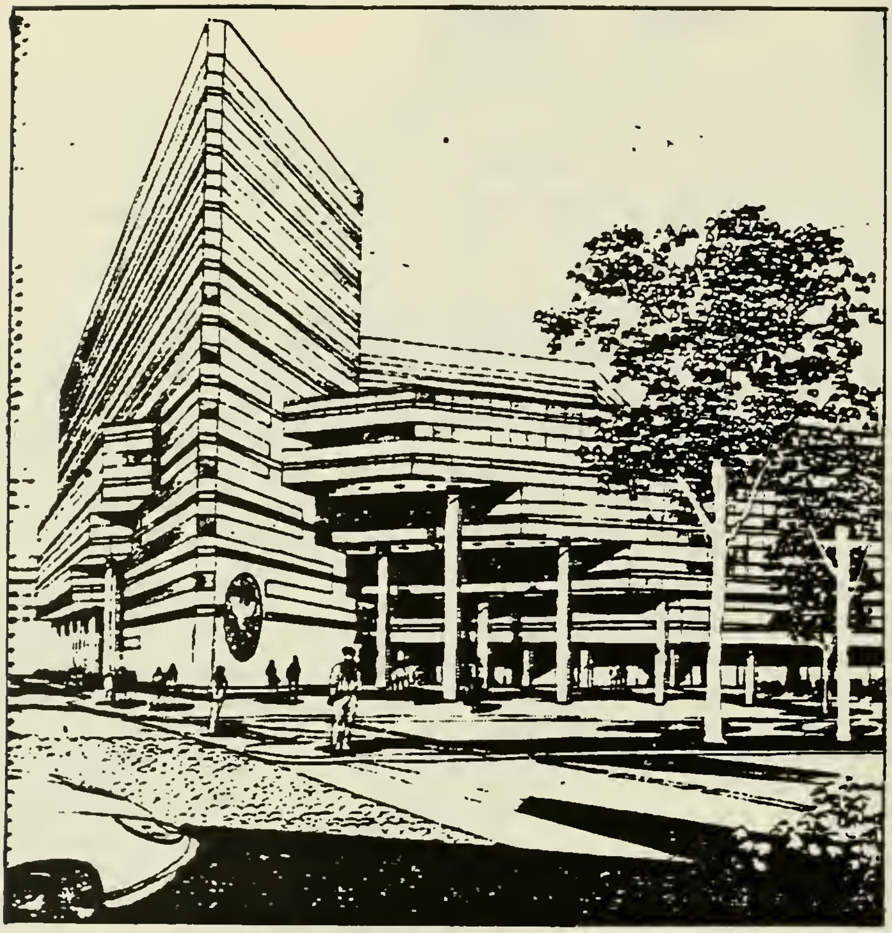


Figure III-10(a): Architect's Sketch of New Federal Office Building: Causeway Street-Lomasney Way Corner

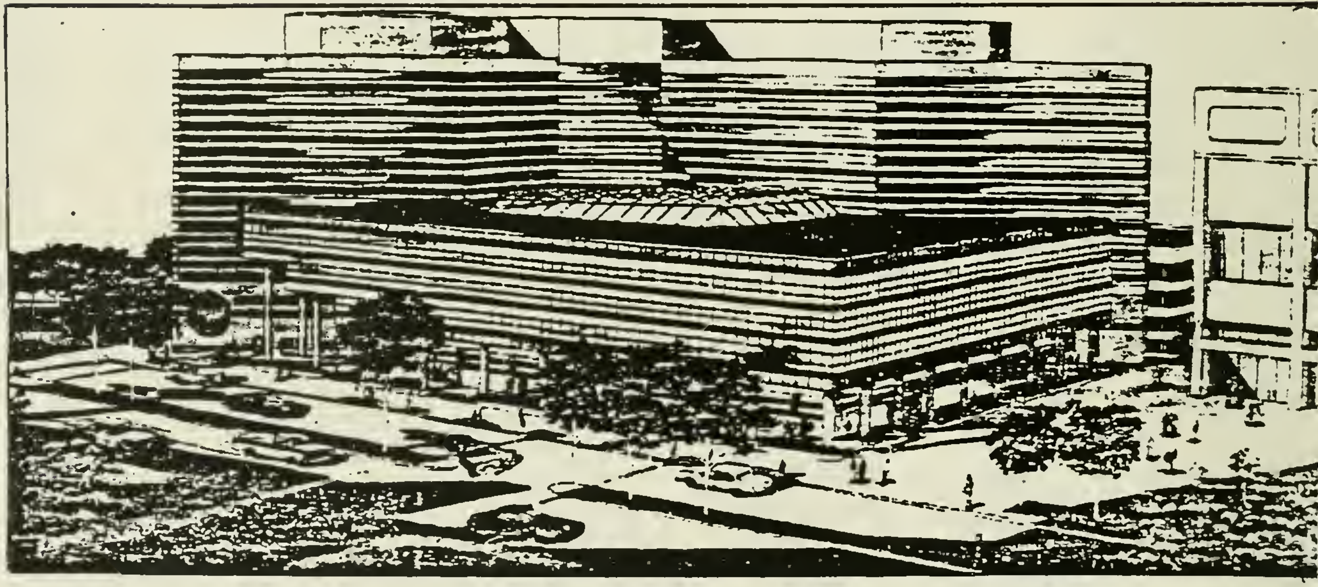
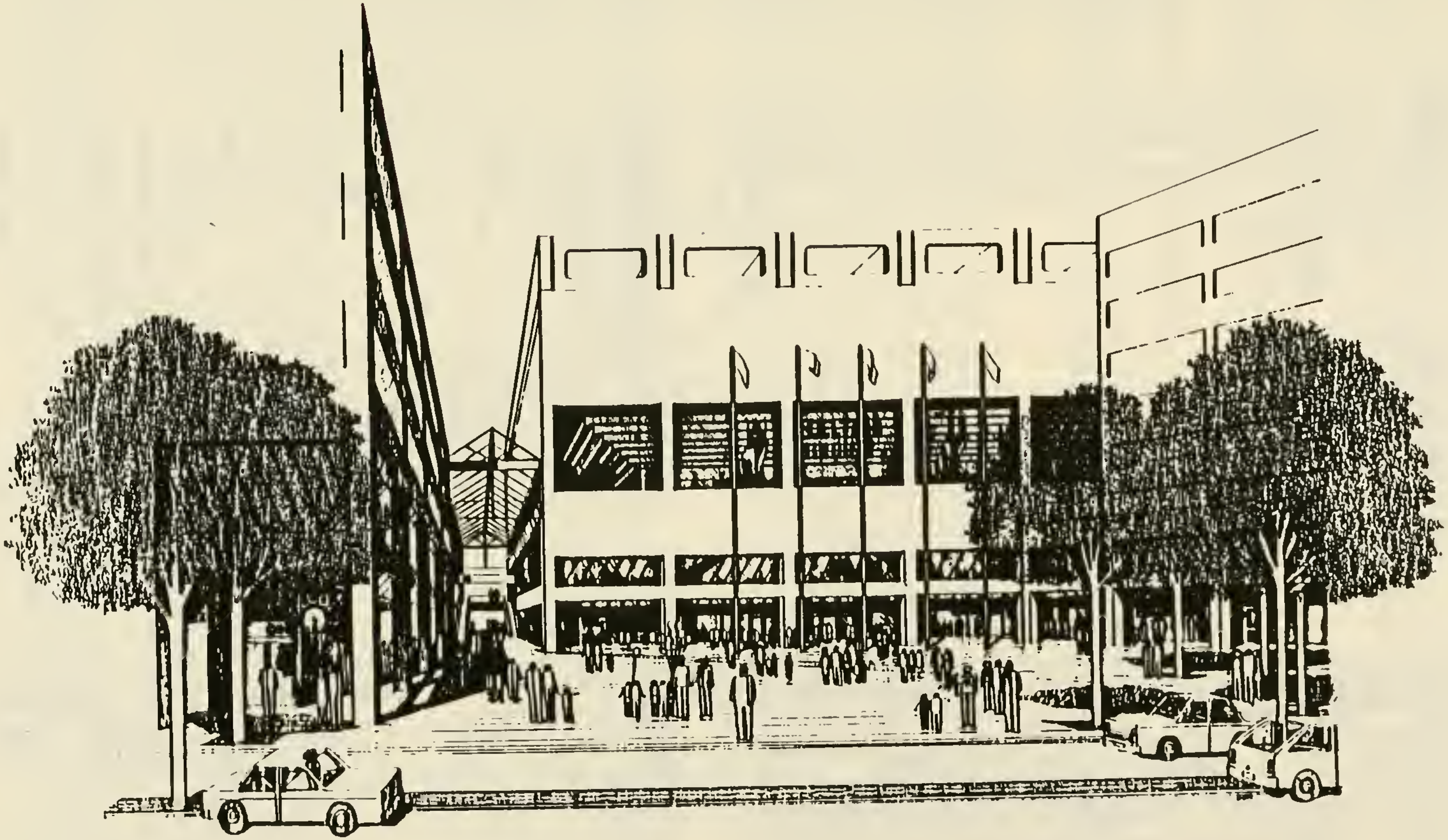


Figure III-10(b): Architect's Sketch of New Federal Office Building: Causeway Street Elevation

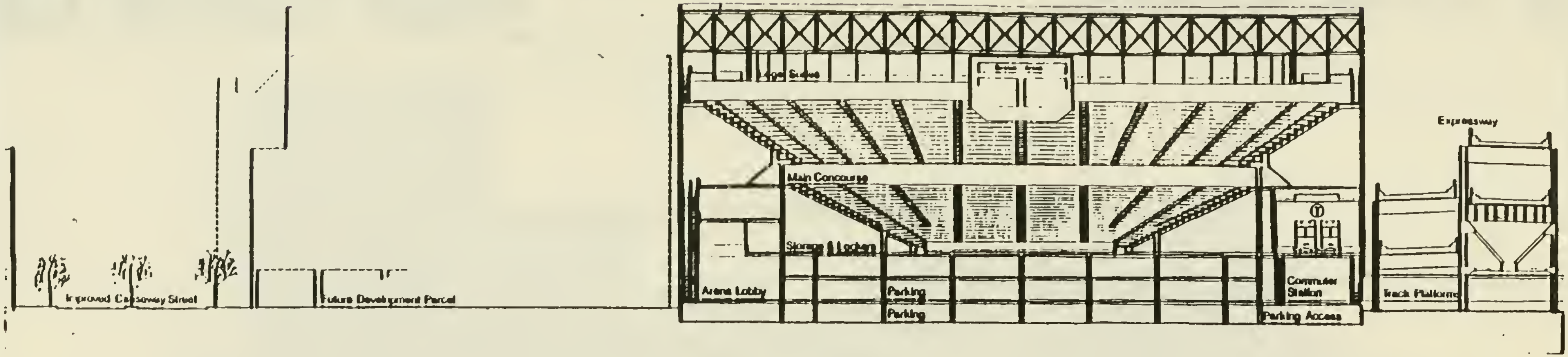


NEW BOSTON ARENA
NORTH STATION DEVELOPMENT PLAN

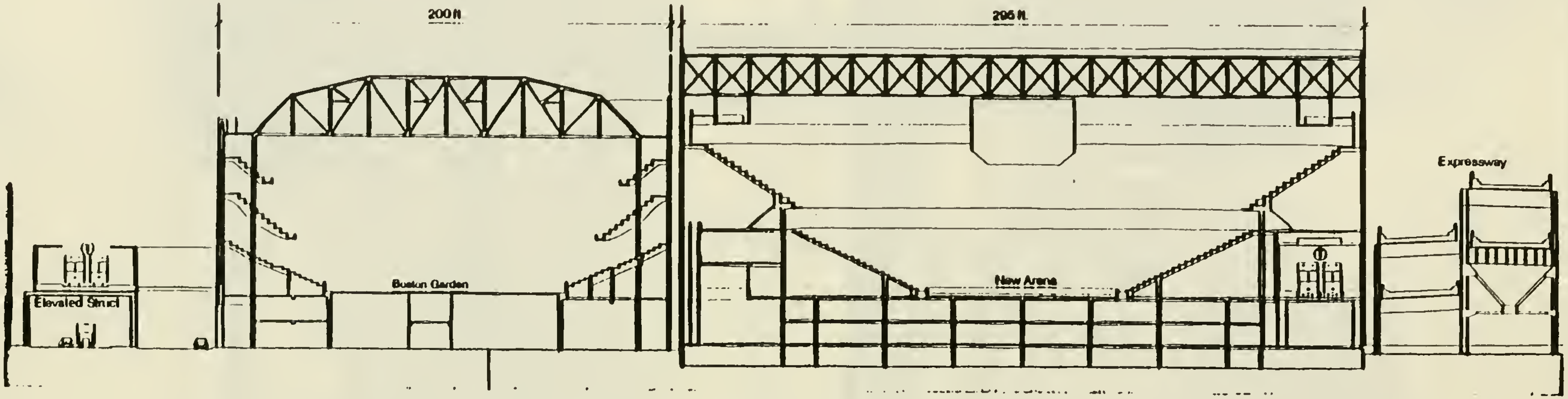
VIEW FROM CAUSEWAY STREET DATE: 18 JUNE 81
BOSTON REDEVELOPMENT AUTHORITY—MOSHE SAFDIE & ASSOCIATES, INC.

6

Figure III-11



Final Development Phase



Construction Phase (with Existing Boston Garden in Place)

NEW BOSTON ARENA
NORTH STATION DEVELOPMENT PLAN·

BOSTON REDEVELOPMENT AUTHORITY—MOSHE SAFDIE & ASSOCIATES, INC.

DATE: 16 JUNE 81
SCALE: 1" - 16'-0"

4

Figure III-12

At the present time, the redevelopment proposal for Sub-area II is primarily conceptual in nature based on the ideas as developed by Moshe Safdie. Over the next several years, the Redevelopment Authority will be undertaking a substantial planning and design program to refine these proposals and to develop and define a more specific plan for this section of the project area. As a result, it is conceivable that extensive revisions to the presently-proposed Phase II development concept could occur and that the ultimate physical design would be substantially different.

The specific land use and development controls for each parcel, as outlined in the Urban Renewal Plan, are attached as Appendix A, and are summarized in Table III-2.

Public Infrastructure Improvements

Several significant public improvements also are proposed in connection with the redevelopment plan for the North Station area. These improvements include the following:

(1) Green Line Relocation - The removal and relocation of the MBTA Green Line elevated structure as it now exists between North Station and Science Park stations is a major planning element of this renewal project and is considered necessary in order for any redevelopment to succeed in the area. Several alternative alignments, including subway extensions, surface options, and enclosed elevated were examined. Based on this alternatives analysis, it was determined that a subway option under the North Station site and an elevated alignment above Accolon Way and adjacent to the Storrow Drive Connector ramps were the most feasible for further consideration.

(2) Merrimac Street/Lomasney Way Widening - Currently, Portland Street and Nashua Street form a one-way pair with Lomasney Way/Merrimac Street to carry traffic between Leverett Circle and the Haymarket/Government Center area. They are inadequate to this function, as well as to the future projected traffic levels. Also, closure of Nashua Street is necessary to the assembly of North Station Project development sites. Therefore, it is proposed that a new two-way arterial street be constructed at the westerly boundary of the North Station project along Merrimac Street and Lomasney Way to provide improved access between Leverett Circle and downtown Boston.

(3) Reconstruction of Causeway Street - With the removal of the elevated Green Line structure, Causeway Street will be reconstructed and widened with 22-foot sidewalks on the north side of the street and 15-20-foot wide sidewalks on the south side, two moving lanes for vehicles and a parking lane of 33-foot width in each direction, and a 6-foot handicapped median strip. Sidewalks will be paved in brick and large street trees, new lighting, and pedestrian amenities will be provided.

(4) Internal Circulation - Within Sub-area I a new service roadway would be constructed from Lomasney Way, running parallel to the Expressway ramps and turning at right angles to connect to Causeway Street along the

Table III-2

DESCRIPTION OF DISPOSITION PARCELS

PARCEL 1 - This parcel consists of 105,000 square feet and will be improved with a government office building - consisting of about 800,000 square feet of which some 500,000 square feet will be office space. FAR is 10.

PARCEL 2 - This parcel consists of 70,000 square feet and will be improved with a 1,000 car parking garage. Easements will be established for the potential use of the relocated Green Line and for an access and service road. FAR is 5.

PARCEL 3 - This parcel consists of 123,000 square feet and will be improved with a 16,000 seat arena with related facilities, a 500 car parking garage under the arena, and a commuter rail terminal. Easements will be established for the potential use of the relocated Green Line and for an internal service road. FAR is 5.

PARCEL 4 - This parcel consists of 50,000 square feet and will be improved with either an office building of 400,000 square feet or a 350 room hotel plus related retail commercial space. FAR is 10.

PARCEL 5 - This parcel consists of 80,000 square feet and will be improved with a public plaza and pedestrian arcade.

PARCEL 6 - This parcel will consist of 275,000 square feet of land to be improved with a commercial structure -- preferably a 400 room hotel with parking and ancillary retail space. FAR is 5. Must allow for a 50-foot pedestrian easement along the Canal and pedestrian connections to the public plaza (Parcel 5).

PARCEL 7 - This parcel will consist of 346,000 square feet of land to be improved with 1,100 units of housing, retail, and restaurant. Parcel will face on the Canal and the river frontage. It will be disected by a road allowing vehicular traffic. FAR is 5. Pedestrian easements must be allowed.

PARCEL 8 - This parcel will consist of 100,000 square feet of land to be improved with a public exhibition hall or museum with ancillary retail, restaurant, and parking. FAR is 5. Pedestrian easements must be allowed. Built over tracks.

present alignment of Beverly Street. This street would tunnel beneath the commuter rail concourse and provide access to the sub-area's parking garages as well as function as a collector for the Sub-area II development. The proposed island would be served by a loop collector road connecting to the Sub-area I service road. A separated pedestrian circulation system also would be constructed, linking both sub-areas together as well as to the adjacent City.

(5) Storrow Drive Connector Relocation - The Storrow Drive Connector to the Expressway presently cuts off the river's edge from the City and impedes development of the North Station area. Long range plans of the MDPW call for improvement of this connector, perhaps with the relocation of the northbound connector in a tunnel under the Charles and a below-grade southbound connector to the Central Artery. Although the current North Station plans retain the Connector in its present location and do not envision its removal in the foreseeable future, the redevelopment proposals do not absolutely foreclose the implementation of this improvement, but severe conflicts would occur if Phase II were developed as presently proposed.

(6) Utility Relocations - The major utility lines in the project area include a combined sewer conduit and a MDC Combined Sewer Overflow conduit in Nashua Street; additional lines provide water, electricity, gas, steam, and other utility services. Many of these lines will need to be relocated in order to implement the assembly of development parcels. The combined sewer conduit would be abandoned and replaced, if required, in the reconstructed Lomasney Way. The Combined Sewer Overflow, which connects from Causeway Street to a new MDC Detention and Treatment Plant recently completed on the Cambridge shore, will continue to have an important function in the regional drainage system and will be retained in place.

Coexistence of Phase I Elements

The Phase I proposal includes, in the area behind the present North Station/ Boston Garden Building, four major elements - a new Arena, a new commuter rail station located within the Arena (with or without a future extension of the commuter rail tracks), a relocation of the Green Line elevated (within the Arena structure) and a service/access road in a tunnel section beneath the commuter rail concourse/Arena. While the coexistence of all these elements may appear to be difficult, preliminary engineering studies have indicated that the problems are not insurmountable but would require a very careful coordination as each of these elements is designed in greater detail (foundations for the Arena, for instance, must be designed to support the load of the Green Line elevated as well as be located to accommodate the access road). In fact, the preliminary design for the Arena does incorporate the relocated section of the Green Line (see Figure III-12). Similarly, preliminary engineering studies for the access roadway indicate the feasibility of constructing this roadway under the commuter rail platform/Arena/Green Line elevated, even if the commuter rail tracks are extended, as under consideration by the MBTA (see Appendix H). The only present conflict would occur if the tracks were extended within the Arena site, in which case the two levels of parking within the Arena would have to be eliminated. There would be, however, sufficient vertical clearance to accommodate the tracks and trains. The compatibility of the various elements is graphically illustrated, in section, in Figure III-13.

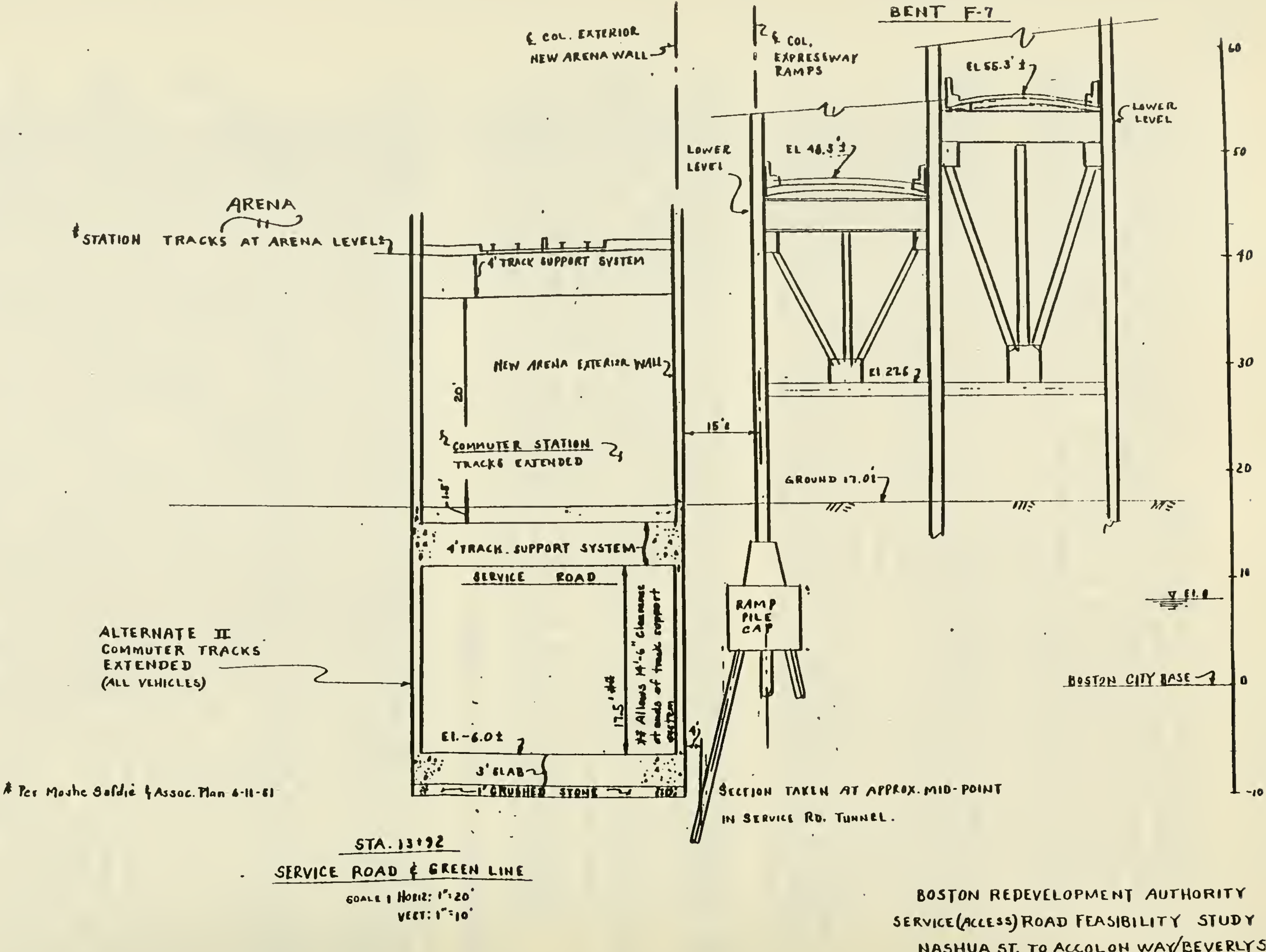


Figure III-13: Compatibility of Project Elements - Phase I

CE Maguire, Inc.

E. Project Objectives and Benefits

The basic objectives and benefits of the North Station Urban Renewal Plan, which constitute the underlying purpose and need for the proposed renewal action, are to:

(1) Encourage the development of a sound, integrated, mixed-use project encompassing public transportation, public riverfront pedestrianways, commercial and office space, hotel uses, and residential use involving housing for families of varying income levels;

(2) Remove blighting influences of the transportation infrastructure and replace blighted conditions and buildings;

(3) Provide higher economic uses through public and private development, thereby increasing property tax revenue; and

(4) Prevent the haphazard redevelopment of the area which would occur as a result of existing patterns of ownership and jurisdictional control.

In order to implement these basic objectives, the Urban Renewal Plan has established several specific planning and design objectives. These objectives are to:

(1) Remove the elevated structure of the MBTA Green Line to eliminate its blighting influence;

(2) Relocate vehicular through-traffic to the perimeter of the project area to alleviate the blighting influence of heavy traffic on streets designed only for local traffic;

(3) Provide a safe, comfortable, and attractive public transportation interchange at North Station for patrons of the MBTA commuter rail, the MBTA Green and Orange Lines, and commuter bus lines;

(4) Provide for the development in Sub-area I of a program of uses, including office space, retail commercial space, and parking, to replace sub-standard buildings and vacant land;

(5) Provide for the replacement and reconstruction of the Boston Garden to create a comfortable, convenient, and attractive sports arena that can be used throughout the year;

(6) Encourage the development in Sub-area II of a mixed program of uses, including hotel, mixed-income housing, parking, and public use space;

(7) Create a system of continuous pedestrian ways and open spaces that connects the Charles River Esplanade with both the North End waterfront and the Canal Street axis of the project, and which provides maximum separation of pedestrian and vehicular traffic;

(8) Take utmost advantage of the riverfront location by creating a canal and island to maximize public river-edge walkways and optimize water orientation of private and public development;

(9) Integrate as to scale, massing, and activity the new development with surrounding areas, especially the riveredge, the Esplanade, and the Bulfinch Triangle area;

(10) Provide adequate utilities, landscaping, streets, and lighting service to the entire site;

(11) Provide a lively mixture of active uses which reinforce each other and stimulate daytime and evening activity; and

(12) Insure superior architectural and aesthetic quality in the planning, design, and construction of all public and private improvements.

F. Project Phasing and Schedule

As noted previously, the North Station Urban Renewal Project will be implemented in two phases. Phase I encompasses the area from Causeway Street north to the Storrow Drive connector from the Expressway and includes the clearance of the Billerica Street area and Madison Hotel and construction of the GSA Federal Office Building, reconstruction of the Boston Garden sports arena, demolition of the existing North Station/ Boston Garden complex, and additional new construction of office, retail and parking uses. Phase I activities also include the removal of the Green Line structure on Causeway Street and the provision of replacement service, the widening of Lomasney Way and Merrimac Street as a peripherial arterial from Haymarket Square to Leverett Circle, the reconstruction of Causeway Street, the construction of an internal service/access roadway, and possibly major utility relocations.

Phase II of the project will be undertaken in 8-15 years and involves the redevelopment of the area north of the expressway ramps, including demolition of the Registry Building and the Massachusetts Rehabilitation Hospital and replacement of the utility structures, construction of the canal channel and island, new construction along the waterfront and on the island, expansion of public parkland along the river and canal edges, and possible rebuilding and/or relocation of the Storrow Drive Connector.

Table III-3 summarizes the project implementation schedule as currently envisioned.

Table III-3

North Station Urban Renewal Project

PROJECT IMPLEMENTATION SCHEDULE

Phase I

Immediate (1-3 Years)

1. Removal of Green Line structure on Causeway Street and construction of a replacement facility.
2. Demolition of Billerica Street area structures.
3. Demolition of Madison Hotel.
4. Construction of GSA Federal Office Building (1983-86).
5. Construction of a new sports arena and commuter rail terminal, together with garaged parking facilities.
6. Widening of Lomasney Way-Merrimac Street and construction of temporary connection to Nashua Street.
7. Reconstruction and landscaping of Causeway Street.
8. Construction of an internal service/access road to serve the Phase I development.
9. Relocation or replacement of water and sewer conduits and other utility lines within Sub-area I as required by site development.
10. Possible extension of commuter rail track.

Short-term (4-7 Years)

1. Permanent relocation of the Green Line from Haymarket to Science Park Station.
2. Demolition of North Station/Boston Garden complex and redevelopment of site with office space, retail facilities and public plaza.
3. Provision of related landscaping, circulation, and utility improvements in Sub-area I.
4. Closure of the remaining portion of Nashua Street to arterial traffic; local service only.

Phase II

Long-term (8-15 Years)

1. Demolition of the Registry Building and Massachusetts Rehabilitation Hospital.
2. Demolition of existing utility structures (Edison steam plant, B&M transformer) and provision of replacement service.
3. Construction of canal channel and island in the Charles River.
4. New construction of hotel, retail, and parking facilities along the waterfront.
5. New construction of housing, retail space, public building/museum, and garaged parking on the island.
6. Provision of related landscaping and site work, vehicular circulation, pedestrian walkways, and utility lines.
7. Extension of public parkland along the edge of the river and canal channel.
8. Rehabilitation and/or repair of commuter rail bridges over the Charles.
9. Possible replacement and/or relocation of the Storrow Drive Connector (by Mass. DPW).
10. Possible relocation on grade or depression of rail lines as part of major Central Artery construction.

G. Project Funding and Permits

1. Project Funding

The total cost of implementing the North Station Urban Renewal Plan is estimated to be approximately $440 million in both public and private investments. A summary of project costs by source follows:

Table III-4

Project Cost Summary

	Public Funding Sources		Private	
	City of Boston	Federal or State	Sources	Total
Phase I	$ 8,075,000	$160,000,000*	$ 45,500,000	$213,575,000
Phase II	36,080,000	28,760,000	161,650,000	226,490,000
Total	$44,155,000	$188,760,000*	$207,150,000	$440,065,000

* Does not include construction costs for Green Line relocation.

Phase I Financing

A total public investment of a minimum of $168,075,000 is required to finance the first phase of the North Station Urban Renewal Project. Of this amount, $7,170,000 is required from State, Urban Systems, and UMTA funds to carry out improvements related to major street improvements and relocation of the Green Line (demolition only). Cost estimates relating to the construction of a new Green Line facility could range between $45 million and $93 million, depending on the alternative selected.

An estimated $6,250,000 is required in public funds for the first phase of the Project to finance project execution activities, land acquisition, relocation, site clearance, construction of related public improvements, and project administration. These funds will be provided by the City of Boston through a Section 108 loan guarantee under the Community Development Block Grant Program of HUD. An additional $1,825,000 of City funds are required for project planning and public improvements.

Finally, approximately $75 million would be required from the General Service Administration to finance the proposed Federal Office Building at North Station, and an estimated $77,830,000 from a newly-created Arena Commission to fund the construction of a new sports arena and associated parking facilities.

Private investment requirements totalling $45.5 million are outlined in the Plan for Phase I.

Phase II Financing

To finance the second phase of the North Station redevelopment, a total public investment of nearly $65 million will be required. Of this amount, $26.46 million is required from Federal and State sources to finance improvements relating to the creation of the proposed canal, land fill for the new island, bridge improvements, air-rights construction over existing train tracks, street construction, and shoreline landscaping for public open space purposes.

The remaining $38.54 million required in public funds for Phase II will be to finance project execution activities, land acquisition, site clearance, utilities, public-related construction, and project administration. While most of these funds are tentatively allocated to the City of Boston, further planning and development activities in Phase II may well indicate the possibility of using other Federal funds such as DOI funds and HUD UDAG funds to finance various public improvements required in order to realize the private development potential of the area.

Private investment requirements for Phase II total nearly $161.65 million. Over half of this total, or $84.5 million, is budgeted for the construction of new housing, with $36 million estimated for a new hotel, and the remaining for supporting retail, commercial, parking, and major public use facility.

2. Project Permits

At the present time, the following State and Federal permits are anticipated to be required in order to implement the North Station Urban Renewal Plan:

Agency	Type of Permit
State	
Department of Community Affairs	Chapter 121B approval of Urban Renewal Plan (obtained January 19, 1981).
Boston Conservation Commission	Order of Condition, pursuant to Massachusetts Wetland Protection Act, M.G.L. Ch. 131, Section 40 (310 CMR 10.00)
Department of Environmental Quality Engineering	
Division of Wetlands Protection	Review and approval of projects in or adjacent to waterbodies or wetlands.

Division of Water Pollution Control	Water Quality Certification, pursuant to Massachusetts Clean Waters Act (314 CMR 9.00) and Section 401 of the Clean Water Act of 1977 (33 U.S.C. 1344).
Division of Land and Water Use	Chapter 91 (Waterways) license and dredging permit, pursuant to M.G.L. Chapter 91, Sections 2, 52-55 and 310 CMR 9.00.
Division of Hazardous Wastes	License regulating the handling, treatment, and disposal of hazardous wastes (including dredged material), pursuant to Massachusetts Hazardous Waste regulations (315 CMR 2.00).
Division of Air Quality Control	State Implementation Plan consistency determination; approval of plans for fossil fuel utilization facilities, pursuant to M.G.L. Chapter 111, Section 31C.
Metropolitan District Commission	Sewer tie-in permits.
Federal	
U.S. Army Corp of Engineers	Section 10 permit regulating construction and dredging in navigable waterways, pursuant to the Rivers and Harbors Act of 1899 (33 U.S.C. 401 *et seq*.); Section 404 permit, regulating filling and discharge of dredged material, pursuant to the Clean Water Act of 1977 (33 U.S.C. 1344); Section 103 permit regulating the discharge of dredged material into the ocean, pursuant to the Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. 1401 *et seq*.).
Boston Air Pollution Control Commission	Parking freeze permit for commercial parking facilities pursuant to the EPA Transportation Control Plan for the Metropolitan Boston Interstate Air Quality Control Region (40 CFR Part 52.1135).

References for Part III

B. Project Background

1. Boston Redevelopment Authority, New Directions for North Station, Boston, November 1977.

2. Moshe Safdie and Associates, Inc., A Development Plan for: North Station District, (1980).

Part IV. ALTERNATIVES TO THE PROJECT

Part IV - ALTERNATIVES TO THE PROJECT

A. Introduction

The Interim EIR, published on August 29, 1980, evaluated a Phase I renewal program which was basically similar in its land use development as the current preferred project described in this document but which differed somewhat in its site design and implementation. The original program proposed, in addition to the new Federal Office Building (in the same location as presently proposed), a major renovation of the North Station and Boston Garden building to expand and provide for more modern facilities for their activities, an extension of the commuter rail tracks to an upgraded North Station concourse, a two-level retail marketplace surrounding the train room and on air rights over the extended rail tracks behind North Station, and structured parking for 1,500 cars adjacent to the expressway ramps, with office or commercial space above. In addition, internal circulation for the total project area was provided by a closed loop roadway connecting the proposed island in Sub-area II to the rest of the project, via Lomasney Way, and by an extension of Accolon Way to the island as a service road. The other transportation-related elements, as well as the total Phase II development program, were essentially the same as in the current proposal. Figure IV-1 indicates the land use plan that was evaluated in the Interim EIR.

Since the filing of the Interim EIR, further design development, necessitated by the potential loss of the City's professional hockey and basketball teams due, in part, to inadequacies and other problems relating to the existing Boston Garden, resulted in a revision to the Sub-area I site plan. In February, 1981, an ad-hoc Arena Committee was established for the purpose of facilitating the construction or renovation of a 16,000-18,000 seat facility to accommodate professional sports, entertainment, and convention events. The Committee considered a wide range of options, including renovation of the existing Garden and proposals to build a new complex in the North Station area and elsewhere. Based on these studies, the Committee concluded that no financially feasible amount of renovation could overcome the Garden's architectual constraints and provide an acceptable number of unobstructed-view seats. In August, the Committee formally recommended the construction of a new arena (without convention facilities) and an adjoining parking garage behind the present Garden, (1) which proposal has been incorporated into the revised Sub-area I development plan.

At the same time, the Interim EIR had identified potentially serious problems from traffic congestion and exceedences of air quality standards resulting from the then-proposed roadway configuration. In order to mitigate or eliminate these problems, a revised internal circulation system has been designed for better distribution of project generated traffic.

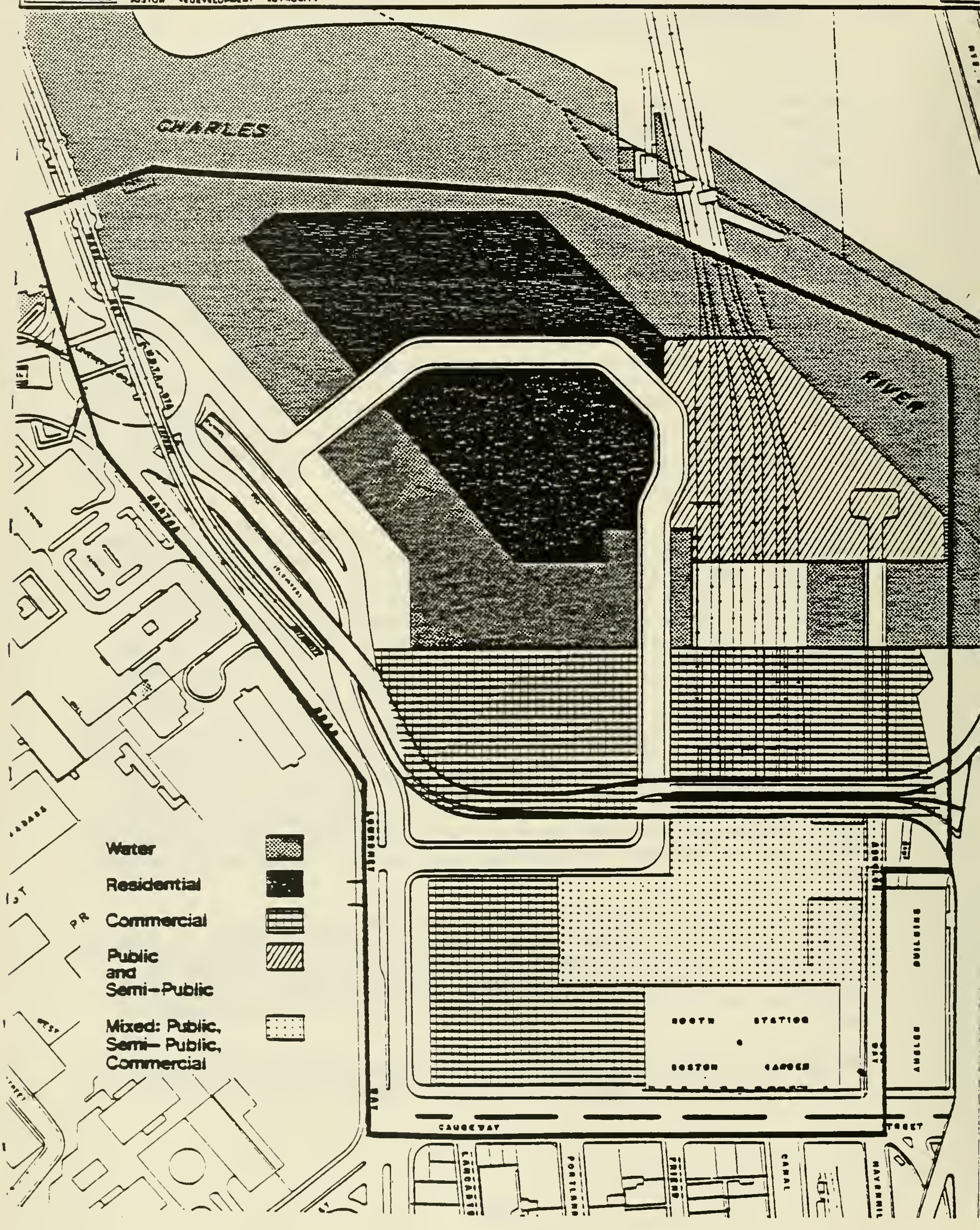
The specific alternatives to the revised program which are considered in this Final EIR/EIS are described in the following sections.

NORTH STATION
REDEVELOPMENT
PROJECT
BOSTON REDEVELOPMENT AUTHORITY

ORIGINAL PROPOSED
LAND USE/DEVELOPMENT
PLAN
(Interim EIR - 1980)

0 200 400 FT.
0 50 100 M.

Figure IV-1



B. No-Build Alternative

The No-Build Alternative assumes a continuation of existing land uses and past trends in the project area. Individual buildings would continue to deteriorate and would be demolished to provide for additional surface parking. In some cases, certain buildings would be upgraded, but no major new investment would take place. The Boston Garden, however, could be expected to undergo major renovation by 1985.* The Registry Building would be vacated by the present transportation agencies when the State Transportation Building in Park Square is completed in 1983, but would be reused for other governmental or private offices. The Massachusetts Rehabilitation Hospital also would be retained (a new service wing was added in 1982).

Under the No-Build Alternative, the blighting influence of the Green Line elevated structure would continue to depress property values and an inadequate street pattern would continue to result in peak-hour traffic congestion. This alternative also assumes that there would be no widening of Lomasney Way and Merrimac Street to improve traffic flow and that the geometrics of the Leverett Circle interchange would remain as they are. Finally, there would not be any extension of the MDC parkland along the edge of the Charles River.

The large areas of open, underutilized land, particularly in Sub-area II, however, do offer development opportunities, and private redevelopment of some of this area by present or future landowners would not be unreasonable to expect. Notwithstanding, in order to maintain an appropriate baseline condition, the No-Build Alternative evaluated in this document does not assume any future private development of this area.

C. Land Use Development Options (Phase I)

Within the Phase I development area (Sub-area I) a number of land use and design options were investigated prior to selecting the preferred program described in the preceding Part. Although these options considered primarily alternative arrangements of the major development proposals, alternative land uses also were evaluated.

Arena Options

Prior to focusing on the presently proposed site behind the existing Boston Garden, several options for locating the new arena within Sub-area I were examined and discussed with the Boston Redevelopment Authority, representatives of the GSA and architects for the new Federal Office Building, and members of the ad-hoc Arena Committee. The alternative site plans reviewed, together with a summary of the advantages and constraints of each, are included in Appendix B. The findings and recommendations of the Arena Committee are included in Appendix C. The two schemes discussed below are variations of Option C.

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* For a description of potential improvements proposed by the present owners of the Garden, see the Attachment to the comments of the Boston Garden Corporation on the Draft EIR/EIS (Part VIII of this Final EIR/EIS).

Based on the review of the site plans, the site behind Boston Garden was selected for the location of the new arena. Two arena configurations were studied for this site, which is somewhat narrower than most facilities currently being used by national basketball and hockey teams (the distance between the Garden and the expressway ramps measures approximately 310 feet). A constant assumption in the design was that the existing Garden had to operate until the new facility was built; thus schemes involving prior demolition of the Garden, although they would remove the space constraints, were not explored. Both options had the same capacity.

Scheme 1 (the design ultimately selected by the Arena Committee) was for a narrow arena measuring 295 feet by 410 feet, which fitted the space but required a balcony to accommodate the required seating. While the balcony would add a cost premium, it is actually an amenity since it would bring more seats closer to the action, providing a sense of intimacy like the present Garden, which measures approximately 205 feet by 430 feet. Otherwise either a smaller capacity would have to be tolerated or a much higher percentage of seats would have to be located at the ends of the playing surface where they would be less desirable.

Scheme 2, a 400 x 400 foot arena on one level, was more typical, both in profile and plan, of a number of arenas built in recent years. No balcony would be required. However, Scheme 2 did require a two-phase construction process. A first phase accommodating a capacity of 12,000 would be built and once the existing Garden building had been demolished, the project would be completed.

Consideration also was given to constructing the arena at grade or on air rights, allowing a major use beneath it. Although the former option clearly would minimize the cost of the structure, it was not considered by the Arena Committee as an advisable option since it would forego the opportunity for integrating other elements of the development plan.

Three functions were investigated for incorporation into the arena - an exhibition center, the extension and modernization of the commuter rail facility, and parking. An exhibition facility was the most intense of the uses proposed and would have required, in addition, the site of the existing Boston Garden as well. This option was the prime choice of the Arena Committee, but it was ultimately rejected because of its distance from the City's major hotels.* (The intensity of use, together with potential conflicts with activity at the arena and in the area, also would have resulted in unacceptable environmental consequences, particularly with respect to traffic congestion and air pollution impacts.) The proposed use, therefore, is a 500-car parking garage and a new commuter rail terminal (without extension of the tracks). It should be noted that all options, with the exception of Scheme I at-grade, also would accommodate the incorporation of the Green Line elevated within the arena structure.

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* In a 1981 convention market study undertaken for the City of Boston by the firm of Peat, Marwick, Mitchell and Co. (New York), the space programing firm of Curtis and Davis, Co., Inc., also evaluated the North Station area but likewise concluded that it did not appear to be an appropriate site for a convention/trade show facility for the following reasons:

1) inadequate space for vehicle and pedestrian circulation and access due to site crowding caused by the multiple planned uses for the site;
2) lack of adequate existing and proposed hotel facilities proximate to the site; and
3) the higher costs required to build such a facility, since the convention facility would be required to be built below the proposed arena, adding high premium costs for service access to the arena.

North Station/Boston Garden Site

With the demolition of the present North Station/Boston Garden structure, a site of approximately 130,000 square feet becomes available for additional development in Sub-area I. The Renewal Plan proposes that this site be subdivided into an 80,000 square foot public open space and pedestrian arcade adjacent to the proposed Federal Office Building and the remainder as a development parcel. Two alternative proposals are under consideration for this parcel. The preferred program calls for the construction of a 400,000 square foot office building. The second option would be a 350-room hotel serving the North Station/Government Center areas. (Under the hotel option, private investment, and thus total project costs, would be reduced by an estimated $6.5 million.)

D. Reduced-Scale Project (Phase II)

A reduced-scale development program for Phase II, indicated in Table IV-1 below, would combine the maintenance or rehabilitation of existing buildings with a significantly less dense scale of new construction and a major extension of the Esplanade. The principal difference between this alternative and the proposed plan relates to the development of Sub-area II; development of Sub-area I would remain the same in both cases. Similarly, the Green Line elevated would be removed and replaced, and Lomasney Way/Merrimac Street would be widened as a peripheral traffic arterial in the reduced scale alternative as well.

Within Sub-area II, the Massachusetts Registry Building would be upgraded for continued office use (either governmental or private) and the Rehabilitation Hospital would be retained. A smaller scale canal and island would be created, the island containing only the hospital and landscaped public open space. The mixed-use complex to the north of the Expressway ramps would be comparable in design to the structure proposed in the Safdie plan, but the use would change from hotel and parking to office and residential space above a parking garage. Retail uses also would be included, but at a reduced scale. Parking would be provided for 1,500 cars. The edge of the canal and the remaining land around the Registry Building that was not required for roadway improvements would be devoted to public parkland and pedestrian ways. The commuter rail tracks would be decked over to allow a continuation of the park functions onto the island. Figure IV-2 shows the site plan for this alternative. (Cost of this optional development program is estimated to be nearly $100 million less than the preferred program.)

Table IV-2 compares this reduced-scale optional program with the preferred development program and the no-build alternative.

Table IV-1

Optional (Reduced Scale) Development Program

Use	Sub-Area I	Sub-Area II	Total Area
Retail/Commercial	125,000 sq.ft.	25,000 sq.ft.[a]	150,000 sq.ft.
Office	1,200,000 sq.ft.	490,000 sq.ft.[b]	1,690,000 sq.ft.
Residential	--	300 units	300 units
Public Open Space	80,000	365,000 sq.ft.[c]	445,000 sq.ft.
Arena	16,800 seats	--	16,800 seats
Hospital	--	284 beds[d]	284 beds
Parking	1,500 spaces	1,500 spaces[e]	3,000 spaces

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a. Includes existing Registry Building (240,000 sq.ft.) plus new construction (250,000 sq.ft.) on Parcel 6.

b. Included in mixed-use development on Parcel 6.

c. Esplanade extension and island.

d. Existing

e. Located in garage on Parcel 6.

E. Green Line Relocation Alternatives

Several options for the relocation of the existing Green Line elevated structure and service were evaluated in the Interim EIR. These alternatives, developed by the EOEA in consultation with the BRA, and the MBTA, are outlined below and are summarized in greater detail in Appendix J.

(1) No-Build/No Action base condition -- maintenance of the existing elevated structure on Causeway Street/Lomasney Way to the Science Park Station.

(2) At-Grade relocation, with any part of the alignment located at-grade.

(3) Relocation of the elevated behind North Station via Accolon Way to connect to Science Park Station.

(4) Subway section along the existing alignment, rising to join the Science Park Station.

(5) Subway section below Causeway Street and Boston Garden, rising to join the elevated Science Park Station.

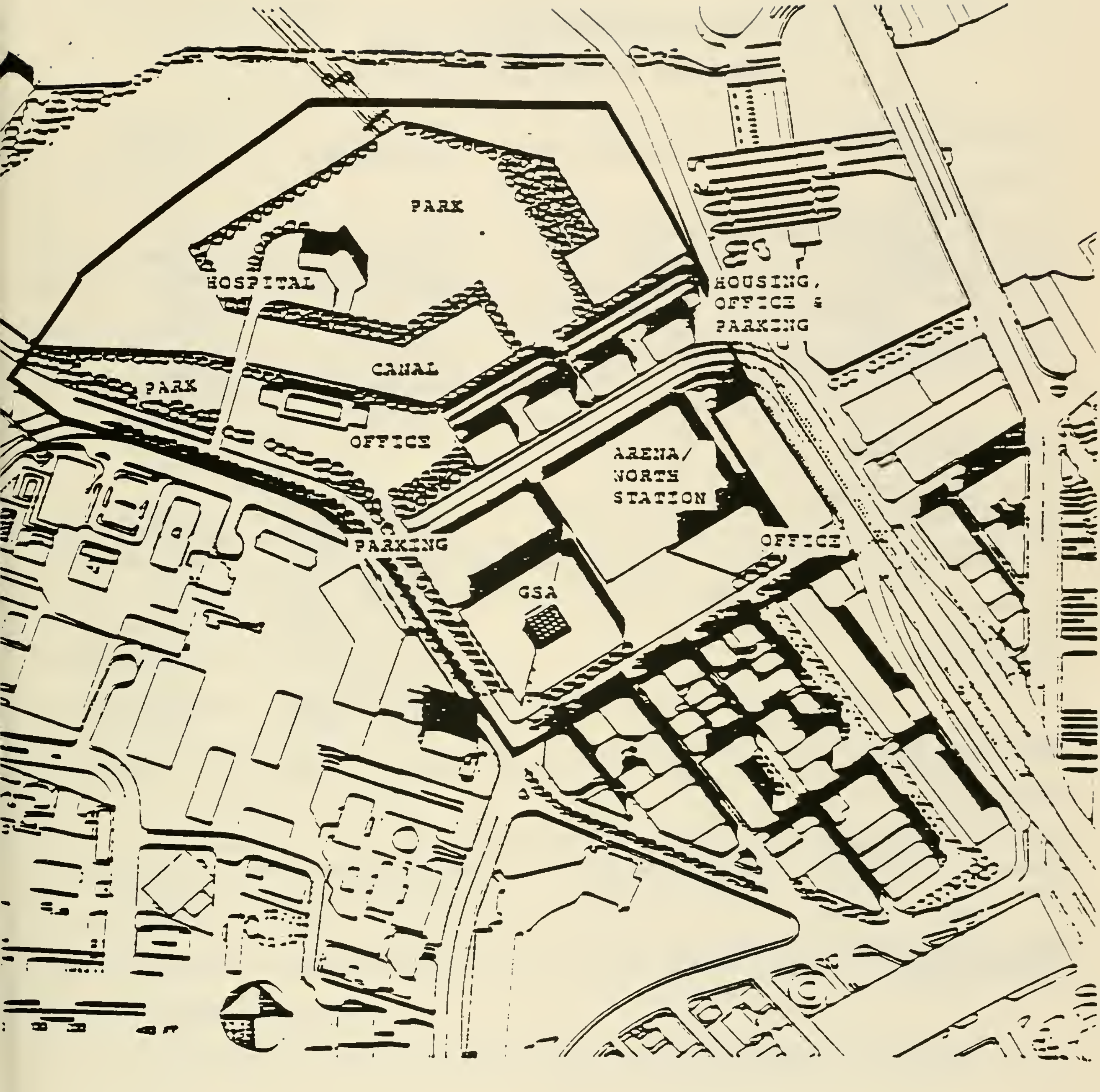

Figure IV-2: SITE PLAN - REDUCED SCALE - (OPTIONAL) DEVELOPMENT PROGRAM NORTH STATION URBAN RENEWAL PROJECT

Table IV-2

North Station Urban Renewal Project

COMPARISON OF PROJECT ALTERNATIVES

Land Use Categories	No Build	Preferred Development	Optional Development
Existing Uses			
North Station/Boston Garden	Rehab	Replace	Replace
Madison Hotel	Rehab	Demolish for GSA	Demolish for GSA
Registry Building	Rehab	Demolish	Rehab
Mass. Rehab. Hospital	Retain (284 beds)	Demolish	Retain (284 beds)
Utility	Retain	Relocate	Relocate
Residential/Commercial	Rehab (104 units)	Demolish for GSA	Demolish for GSA
Surface Parking	Retain (2332 sps)	Relocate to garages	Relocate to garages
New Construction			
Arena (excl. Parking)	-	350,000 sq. ft.	350,000 sq. ft.
Retail/Commercial	-	215,000 sq. ft.	150,000 sq. ft.
Office	-	1,200,000 sq. ft.	1,450,000 sq. ft.
Luxury Hotel	-	225,000 sq. ft. (400 rooms)	--
Residential	-	1,300,000 sq. ft. (1,100 units)	350,000 sq. ft. (300 units)
Public/Museum	-	115,000 sq. ft.	--
Parking	-	1,295,000 sq. ft. (3,700 spaces)	1,050,000 sq. ft. (3,000 spaces)
Public Open Space	-	320,000 sq. ft.	445,000 sq. ft.
Transportation			
Streets/Rights-of-Way	607,000 sq. ft.	583,700 sq. ft.	513,700 sq. ft.
Commuter Rail Tracks	180,000 sq. ft.	(Covered)	(Covered)
Canal	-	211,000 sq. ft.	175,000 sq. ft.
Total Square Footage (Building Area)	1,134,000 sq. ft.	4,700,000 sq. ft.	3,745,000 sq. ft.

(6) Subway section below Causeway Street, Boston Garden, and the Charles River, linking with the Lechmere Station in Cambridge.

(7) Subway section below Merrimac Street/Lomasney Way, rising to join the Science Park Station.

(8) Replacement of Green Line transit service from North Station to Lechmere Station by bus service.

Based on the initial analysis of the eight alternatives and consultation with the BRA, GSA, and the Massachusetts DPW, the MBTA selected four alternatives for further study in a "Preliminary Alternatives Analysis". (1) The recommended alternatives included: Alternative 3; Relocated Elevated Structure; Alternative 5A; Subway under Portland Street; Alternative 5C, Subway adjacent to Accolon Way; and Alternative 7, Subway under Merrimac Street/Lomasney Way. A second report, Green Line North Station Preferred Alternatives Report, (2) discussed the feasibility of these four "build" alternatives in depth and recommended that two - Alternatives 3 and 5C - in addition to a "no-build" alternative be carried forward for detailed analysis in a Draft EIR/EIS. Subsequently, UMTA requested that a fourth option - upgrading of the existing elevated alignment along Causeway Street - also be studied in the Draft EIR/EIS. The Green Line North Station Draft EIR/EIS, which also has been filed with the Massachusetts EOEA as a Supplemental EIR for the North Station Urban Renewal Project, was published on July 27, 1982. Analyses from this environmental study have been incorporated, as appropriate, into this Final EIR/EIS.

F. Commuter Rail Options

A number of commuter rail options also are examined and include:

(1) Maintenance of the existing rail terminus at its present location, connected to a new North Station concourse on the ground floor of the arena structure.

(2) Extension of the existing tracks to a relocated North Station concourse beneath the arena, to accommodate longer trains.

(3) Construction of high level platforms to service the commuter trains.

(4) Decking over the tracks and providing the necessary ventilation.

G. Roadway Alternatives

Within the North Station Renewal Area, roadway improvements are governed by several basic locational requirements, including:

(1) the need to close Nashua Street in Sub-area I in order to provide an acceptable development parcel for the GSA Federal Office Building.

(2) the need to eliminate the present traffic congestion in the area by rerouting through traffic from local streets to a circumferential arterial system.

(3) the need to coordinate the interrelationship of roadway improvements to the various alternative treatments of Green Line relocation.

(4) the need to provide efficient service to future development parcels.

The compactness of the project area and the scale of proposed development, however, limit to a great extent the roadway options available for consideration. The principal alternative examined, during the preliminary design process for the redevelopment plan, was the internal circulation system to serve the proposed development. In addition, although not a part of the Urban Renewal Plan, there are presently under consideration by the Commonwealth a number of alternative proposals for the relocation of the Storrow Drive/Central Artery Connector ramps and a proposal for the widening and depression of the elevated Central Artery and the construction of new low-level bridges over the Charles River.

Internal Circulation System

The original redevelopment plan for the North Station project, as approved by the Boston Redevelopment Authority in 1980, called for the construction of a closed-loop roadway to connect the proposed island to the rest of the project area, via Lomasney Way. Since the Interim EIR identified serious problems of traffic congestion and violations of air quality standards which were expected to result from this circulation proposal, alternative roadway alignments were studied in an attempt to develop a more efficient distribution of project-generated traffic. Evaluated in this EIR/EIS, then, is a revised internal circulation scheme which does not concentrate all project traffic on one peripheral roadway system but rather provides access/egress points on both Lomasney Way and Causeway Street.

Storrow Drive/Central Artery Connector

For several years the Massachusetts Department of Public Works (MDPW) has proposed an improvement of the Central Artery/Leverett Circle link, including relocation of the Northbound Connector between Storrow Drive and I-93/Route 1, possibly in a tunnel segment under the Charles River, and reconstruction of the Southbound Connector below grade to connect with the Central Artery. While these plans still exist, neither improvement is now being pursued by the MDPW, having been superceded by the more recent Central Artery depression proposal (*v. infra.*). Consequently, the current proposal for the North Station development assumes a continuation of the connector ramps in their present location (although the BRA would prefer to see the ramps removed or substantially modified). It should be noted that neither Phase I nor Phase II is specifically dependent upon the removal of these ramps, nor do the proposals foreclose the opportunity to implement the proposed modifications in the future, although serious conflicts would result.

Two years ago the MDPW updated its proposal for the Storrow Drive Connector relocation/replacement. In May, 1981, the Department published a report entitled, Central Artery Leverett Circle Connection Feasibility Study, (1) which examined the engineering feasibility and acceptability of a future new connector from Leverett Circle and Storrow Drive to the Central Artery North Area Project in Charlestown. Four alternative conceptual designs were examined, three crossing the Charles River by means of a series of bridges while a fourth utilized tunnels; these are described in greater detail in Part VI.C-6 below. The major conclusions of the study were that the construction of a connector was physically possible and that the tunnel scheme generally had better geometrics and aethetics, and provided better operating characteristics, than the bridge alternatives. The consultants recommended, therefore, that the possibility of a new connector should be included in the Department's long-range planning process and that the tunnel option should be pursued.

Although, because of the Central Artery depression, these proposals are not currently being considered by the DPW, they are still considered valid should the Artery depression project not be approved by the Federal Highway Administration and could be recommended in the future.

Central Artery Depression

During the past decade, improvements to Boston's elevated Central Artery though the downtown area and an additional cross-harbor facility have been under active study by the Commonwealth of Massachusetts. Following publication of a Draft Environmental Impact Statement/Report on a Third Harbor Tunnel project on December 1982, the State administration, with the cooperation of the Federal Highway Administration, decided to expend the tunnel environmental study to include a proposed depression and widening of the Central Artery from the Massachusetts Turnpike interchange northerly, across the Charles River, to an interchange with Interstate 93 and Route 1. The primary purpose of this project is to provide more capacity on the extremely congested Central Artery in order that this major arterial may operate in a more efficient manner. In June, 1983, a Supplement to the Draft EIS/EIR was published by the Federal Highway Administration and Massachusetts Department of Public Works which included the Artery depression project along with additional Third Harbor Tunnel options. (2)

The proposed depression and widened Central Artery (Figure IV-3) would have four to five lanes of traffic in a tunnel section in each direction (in contrast with the current three) and improved ramp connections to the downtown area. The present elevated structure would be removed and a new continuous surface arterial would be reconstructed at grade. The existing high-level bridge over the Charles River would be replaced by two lower-profile parallel bridges (each a four-lane, single span-tress) which would merge into a modified interchange with Interstate 93 and Route 1. The depressed Central Artery would emerge through a portal north of Causeway Street, within the alignment of Beverly Street.

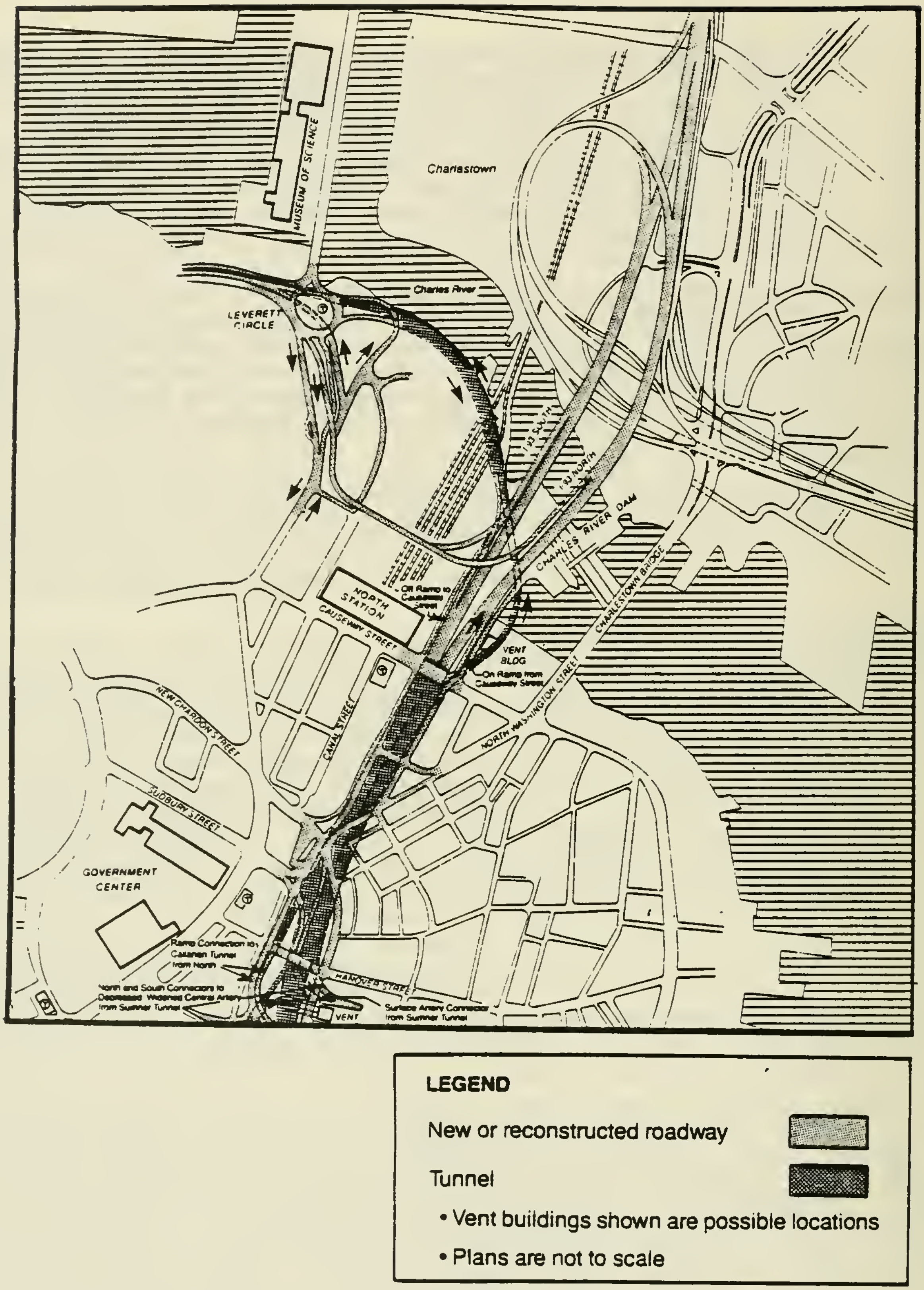
Charlestown
MUSEUM OF SCIENCE
Charles River
LEVERETT CIRCLE
I-93 SOUTH
I-93 NORTH
CHARLES RIVER DAM
CHARLESTOWN BRIDGE
NORTH STATION
CAUSEWAY STREET
Off Ramp to Causeway Street
VENT BLDG
On Ramp from Causeway Street
NEW CHARDON STREET
CANAL STREET
NORTH WASHINGTON STREET
SUDBURY STREET
GOVERNMENT CENTER
Ramp Connection to Callahan Tunnel from North
North and South Connectors to Depressed Widened Central Artery from Sumner Tunnel
HANOVER STREET
VENT
Surface Artery Connector from Sumner Tunnel
LEGEND
New or reconstructed roadway
Tunnel
• Vent buildings shown are possible locations
• Plans are not to scale

Figure IV-3: PROPOSED CENTRAL ARTERY DEPRESSION PLAN

Source: Federal Highway Administration/Massachusetts Department of Public Works, Supplement to the Draft Environmental Impact Statement/Report - Third Harbor Tunnel, Interstate 90 / Central Artery, Interstate 93, Boston, Massachusetts (FHWA-MA-EIS-82-02-DS), June 1983.

In the North Station Area, new on-ramps to Interstate 93 northbound are planned from Causeway Street and from Storrow Drive/Leverett Circle (the latter replacing the existing ramps behind North Station). New off-ramps from Interstate 93 southbound would be provided to Leverett Circle and Causeway Street. In addition, two parallel tunnels would connect Storrow Drive/Leverett Circle to the Central Artery southbound and from the Artery northbound; the alignment of these tunnels generally would follow the existing shoreline. Nashua Street is proposed to be realigned from the Massachusetts Rehabilitation Hospital, passing over the new Storrow Drive ramp tunnels, and into Leverett Circle. As noted in Part VI.C.7, this proposal is inconsistent with the redevelopment plans for the North Station Area and would have serious negative impacts.

References for Part IV

A. Introduction

(1) The Arena Committee, "Final Recommendations", August, 1981.

E. Green Line Relocation Alternatives

(1) Massachusetts Bay Transportation Authority, *North Station Green Line Preliminary Alternatives Analysis*, prepared by Charles G. Hilgenhurst Associates, Inc., *et al*., (n.d.)

(2) Massachusetts Bay Transportation Authority, *Green Line North Station Preliminary Alternatives Report*, prepared by Charles G. Hilgenhurst Associates, Inc., and Fay, Spofford & Thorndike, Inc., *et al*., March, 1981.

G. Roadway Alternatives

(1) Louis Berger and Associates, Inc., *Central Artery Leverett Circle Connection Feasibility Study*, prepared for Commonwealth of Massachusetts Executive Office of Transportation and Construction, Department of Public Works, May, 1981.

(2) Federal Highway Administration/Massachusetts Department of Public Works, *Supplement to the Draft Environmental Impact Statement/Report - Third Harbor Tunnel, Interstate 90/Central Artery, Interstate 93, Boston, Massachusetts* (FHWA-MA-EIS-82-02-DS), June 1983.

Part V EXISTING ENVIRONMENTAL CONDITIONS

Part V - EXISTING ENVIRONMENTAL CONDITIONS

A. Historic Setting

1. Historical Background and Development*

The present-day North Station Project Area originally was part of the mouth of the Charles River, almost entirely separated from a large marshy cove to the southeast by a long, narrow island (or causeway) of relatively solid ground, which was located at approximately the current alignment of Causeway Street. The original shoreline extended from Barton's Point near the foot of the former Leverett Street (now Leverett Circle) and thence turned sharply to the southeast almost to Hanover Street before swinging northwest to Hudson's Point (Copp's Hill) in the North End, enclosing a salt marsh cove (the North Cove) which corresponded generally to the present Causeway-Merrimac-Washington Streets triangle.

Archaeological evidence indicates that an Indian civilization existed along the banks of the Charles before 3000 B.C. and that the Indians used the river for fishing and as a center of their lives. Although the Massachusetts Bay region was visited by several 16th century explorers, the first recorded European exploration of the river was by Samuel du Champlain in 1605,** who named it "Riviere du Guast" after a fellow explorer, Pierre du Guast, who was attempting to establish a settlement along the North Atlantic coast. Captain John Smith explored the harbor in 1614 and, observing the river, named it the "Charles" in honor of the English prince and later king.

Boston itself was founded as a town in 1630, by the remnants of John Winthrop's colony from Charlestown. On July 31, 1643, the town granted to Henry Symonds, George Burden, John Button, John Hill, and their partners the North Cove with adjoining marshland, on the condition that within three years they "erect...one or more corne mills and mayntayne the same for ever." The forenoted island separating the cove from the river the mill proprietors reinforced and widened into a dam, thus impounding the water and converting the cove into a mill pond, which maintained a grist mill, a saw mill, and, later, a chocolate mill (Figures V-1, V-2).

A century and a half later, on March 9, 1804, the successors to the original Mill Pond proprietors were incorporated by the General Court as the Boston Mill Corporation, apparently for the purpose of filling in the Mill Pond to provide more land area for the expanding town of Boston, and on May 14th, following considerable debate, the town meeting approved the filling. The filling began in 1807 and continued until the end of 1822*** with Beacon Hill gravel, as well

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* Reference material for this section is listed in the Bibliography.

** There is no hard evidence that the Norsemen ever explored the area.

*** Winsor, (The Memorial History of Boston (1630-1880), Vol.IV, p.32), however, states that this process was slow and required 25 years to complete. Deeds of the period appear to support Winsor.

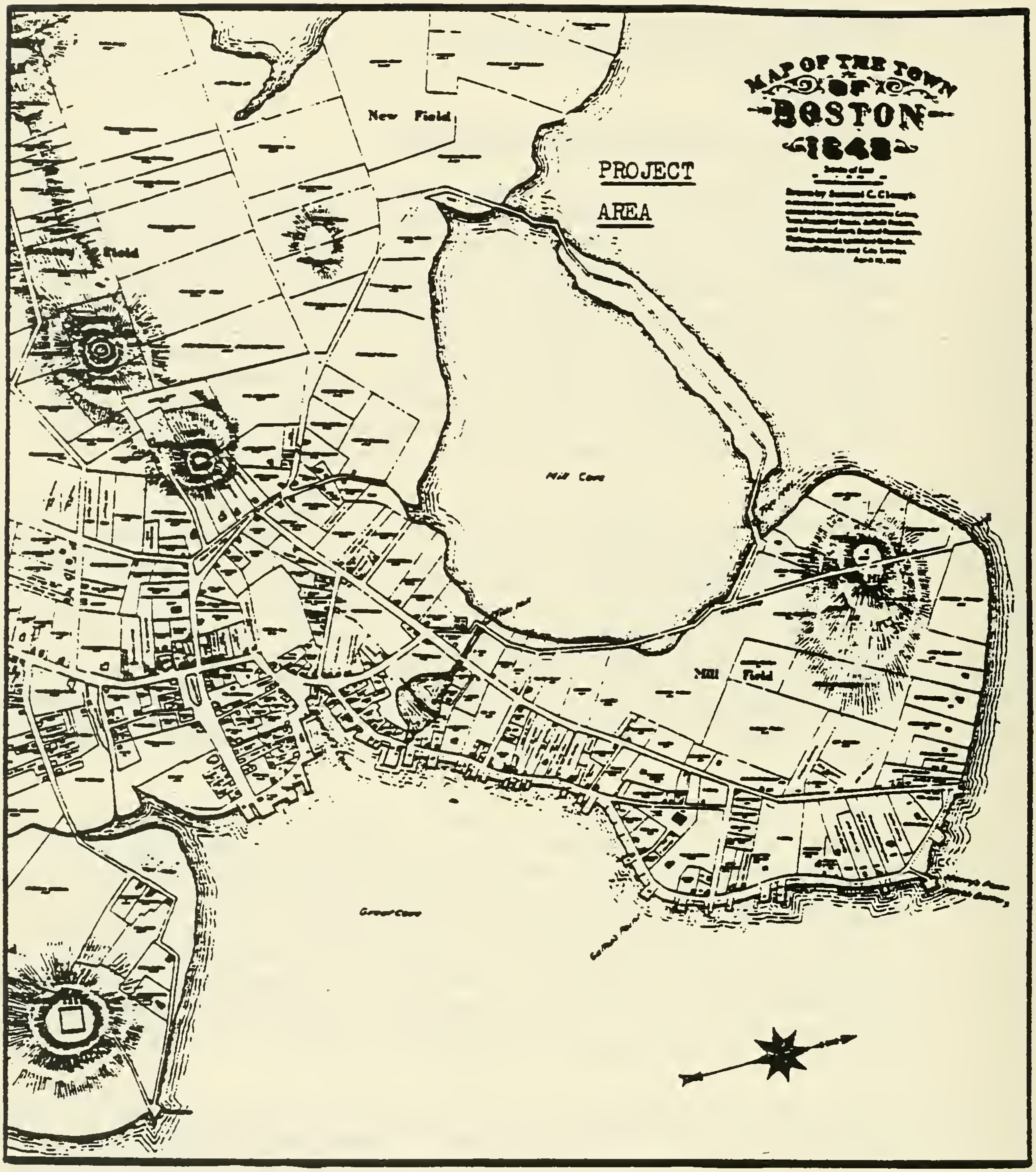

Figure V-1: NORTH STATION PROJECT AREA - 1648
(Samuel C. Clough, 1919)

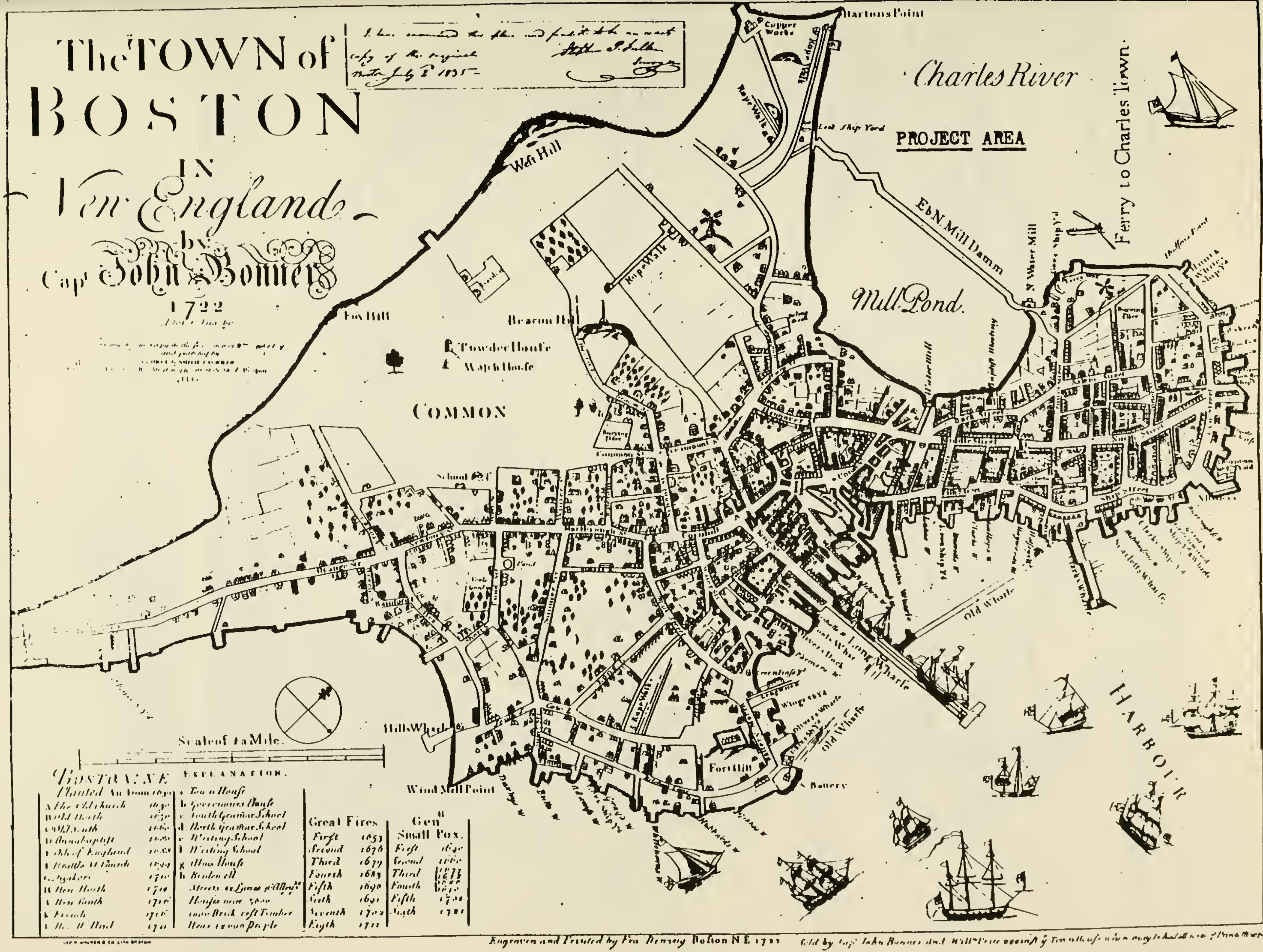

Figure V-2: NORTH STATION PROJECT AREA - 1722

as oyster shells, rubbish, and street sweepings. In 1808, Charles Bulfinch was commissioned to draw up plans for the Mill Pond area (henceforth known as the "Bulfinch Triangle"), with Causeway Street generally following, but straightening, the line of the mill dam and with rectangular blocks filling the triangle (Figure V-3). With the Mill Pond filled, several wharves were extended into the river from Causeway Street, beginning in the 1830's, and by mid-century the entire area north of Causeway Street was filled with these wharves.

The extreme western edge of the present North Station project area was originally the extension of the shoreline known first as Haugh's, and later as Barton's, Point (named for James Barton, a noted ropemaker), and for much of the 18th century this lowland was a sparsely settled quarter containing two shipyards, a copper works, three ropewalks, a windmill, and a handful of houses. Leverett Street, which ran parallel to the shoreline, was laid out in 1725,* and in the summer of 1809 it was extended across the Charles River to Lechmere Point in Cambridge with the construction of a toll bridge called Canal or Craigie's Bridge.

The mid-1830's saw the beginning of the North Station district as the northern transportation terminus of the City of Boston. In 1835, from May 5th to October 5th, eight acres of the Charles River north of Causeway Street and parallel to Leverett Street were filled to a depth of 14 feet by Patrick Trancy Jackson, treasurer of the Boston and Lowell Railroad (incorporated in 1830), in order to create new land for the railroad from the north. The following spring Lowell, Nashua, Andover, and Billerica Streets were laid out on the new land.

The filling completed, the Boston and Lowell Railroad brought its tracks across the Charles, just east of Craigie's Bridge, to a station on Barton's Point, which was relocated in 1857 to Causeway Street. The Boston and Maine Railroad and the Fitchburg Railroad followed in 1845, by bridges over the Charles parallel to the Boston and Lowell, and the Eastern Railroad, by a circuitious route through Chelsea, Everett, Somerville, and Charlestown, in 1854. Imposing stations were built on Causeway Street by these railroads** (the B&M, however, extended all the way to Haymarket Square where, due to a City ordinance forbidding locomotives from crossing Causeway

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* Thwing (The Crooked and Narrow Streets of the Town of Boston, 1630-1822, p. 202), but Bonner's map of 1722 appears to show a roadway along the alignment of Leverett Street.

** Interestingly, the Fitchburg Station included a great hall over the terminal (memorable as the scene of Jenny Lind's first appearance in Boston in October, 1850), a precursor of the present-day North Station/Boston Garden complex.

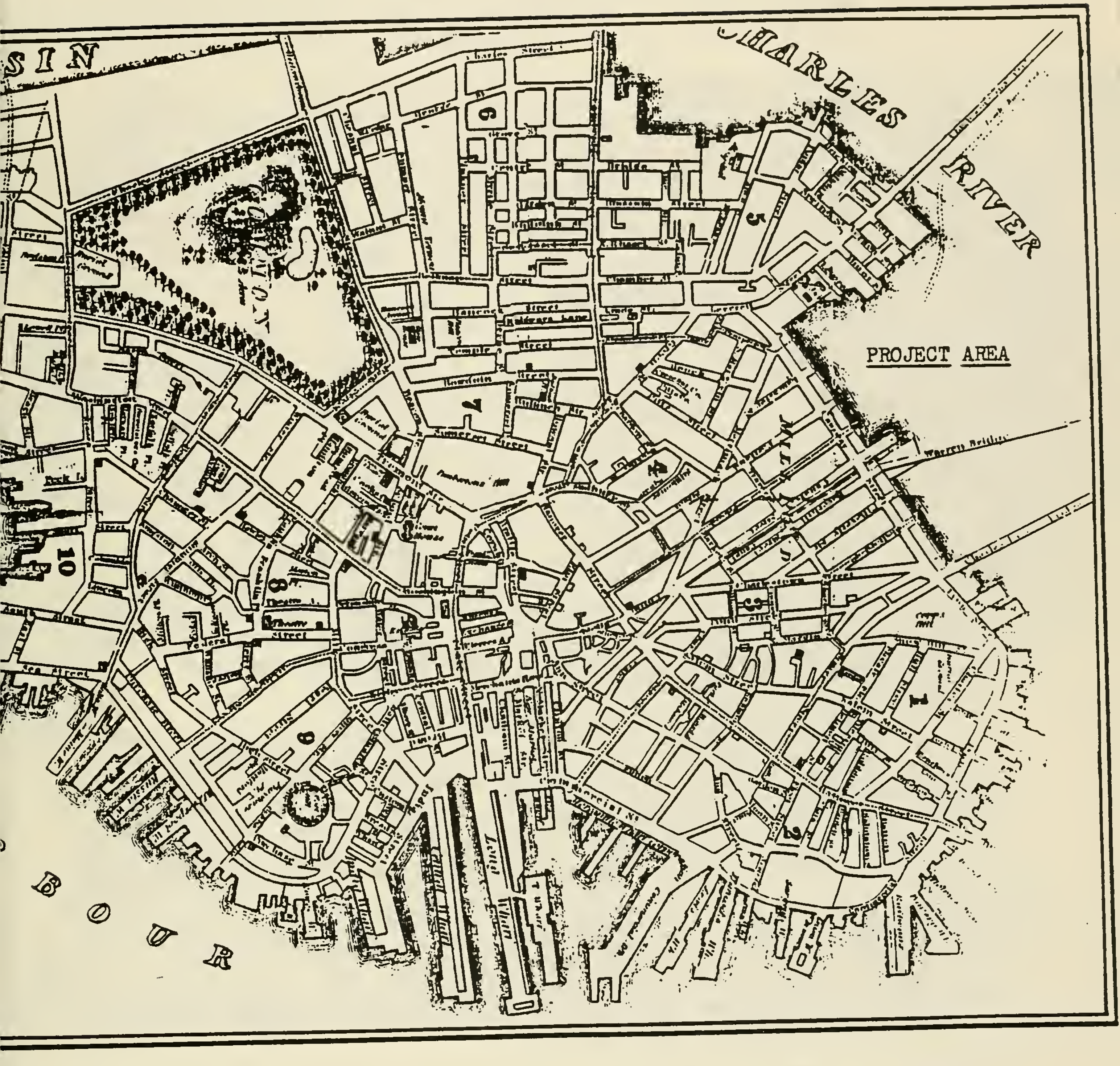

Figure V-3: NORTH STATION PROJECT AREA - 1832
(Boston Directory)

Street, trains had to be hauled into and out of the station by horses). Thus by the mid-1850's, Causeway Street had assumed its railroad terminal character that it has today, as all four of the northern lines came into the old Mill Pond region (Figure V-4).

With the entrance of the railroads and the construction of the terminals, the wharf area north of Causeway Street was gradually filled in, a process that was completed by the mid-1880's (Figure V-5). In 1894, the Boston and Maine, Boston and Lowell, Eastern, and Fitchburg lines were consolidated into a Union Station, forming the largest railroad station in the country,* which served 500 trains daily on 23 tracks. Several years earlier, the original Boston and Lowell terminal at Barton's Point had been converted into a freight depot, which was considerably expanded in the mid-1860's with the purchase of the Mill Pond Wharf Estate at Lowell and Minot Streets. From the late 1800's, the economic vitality of the North Station area grew as a direct result of the exchange that developed between these railroads and the manufacturing and wholesale businesses established in and around the Bulfinch Triangle area, which required good access to this type of transportation network.

By the turn of the century, another transportation mode - the elevated transit lines of the Boston Elevated Railroad Company - made its appearance in the North Station Area.** The first was the elevated to Charlestown (the present-day Orange Line), which rose above ground from the subway tunnel at Haymarket Square along Haverhill Street, turned down Causeway Street, and crossed the Charles River over the Charlestown (North Washington Street) Bridge. This line opened for service in 1901. In 1975, the elevated structure was demolished and was replaced by a subway tunnel under Accolon Way and the river.

The East Cambridge extension of the Tremont Street subway (the modern Lechmere branch of the Green Line) was completed in 1912. In 1906, the General Court had granted the Boston Elevated Railway Company the right to construct an elevated railway between North Station and Lechmere Square (Acts of 1906, Chapter 520).*** Construction of the Charles River Viaduct and the steel elevated structure from the Haymarket incline began in 1907, and service was

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* The imposing Lowell Station of 1873 continued in use, forming the southern end of the Union Station.

** Previously, the area was served by electric trolley cars of the West End Street Railway Company.

*** Prior to 1905, most surface lines from East Cambridge and Somerville entered Boston over the Craigie Bridge. In the winter and spring of 1905, a temporary bridge was constructed beside the Craigie Bridge to allow its closing for the construction of the Charles River Dam with a roadway on top.

PROJECT AREA

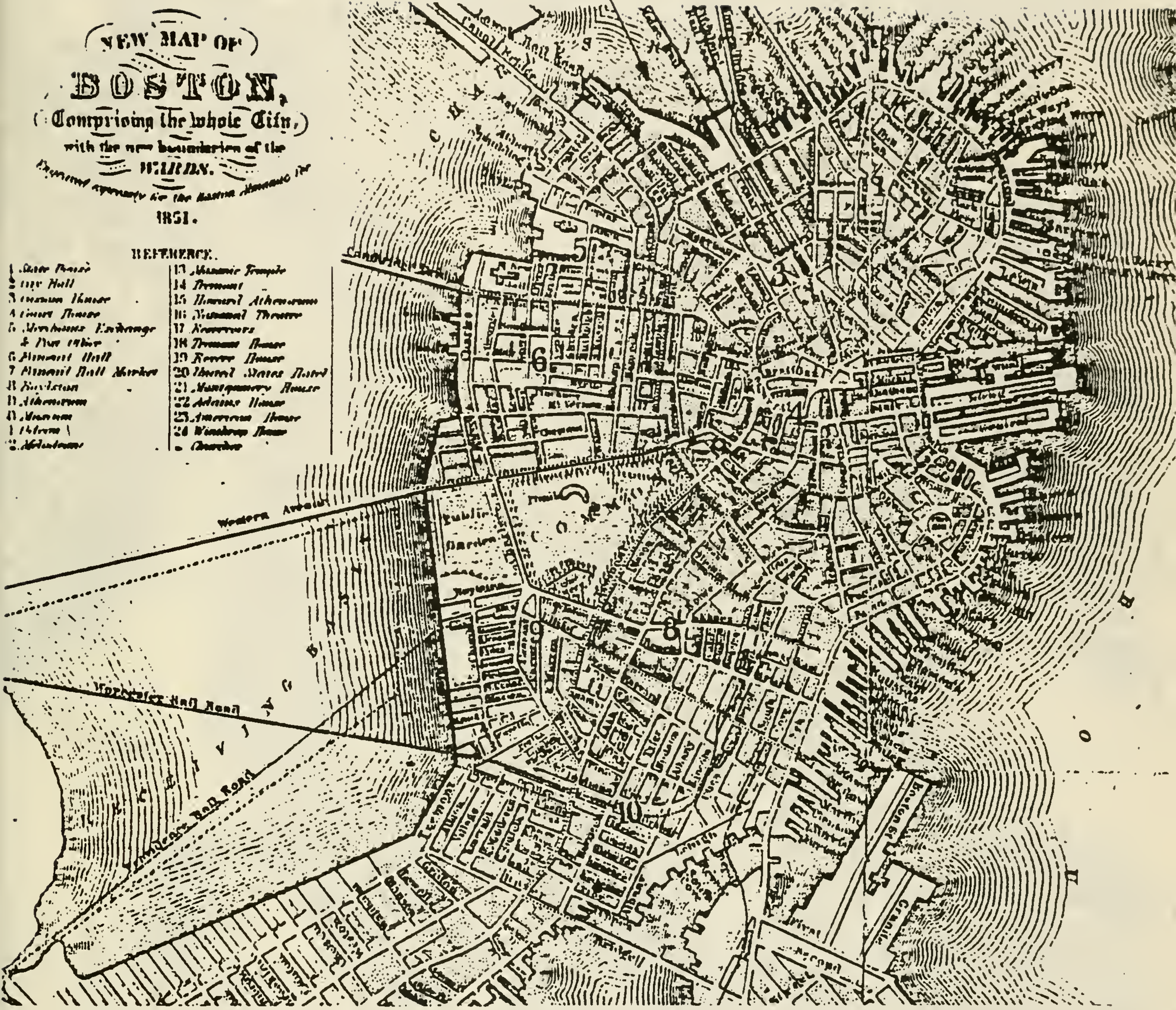

Figure V-4: NORTH STATION PROJECT AREA - 1851
(Boston Almanac)

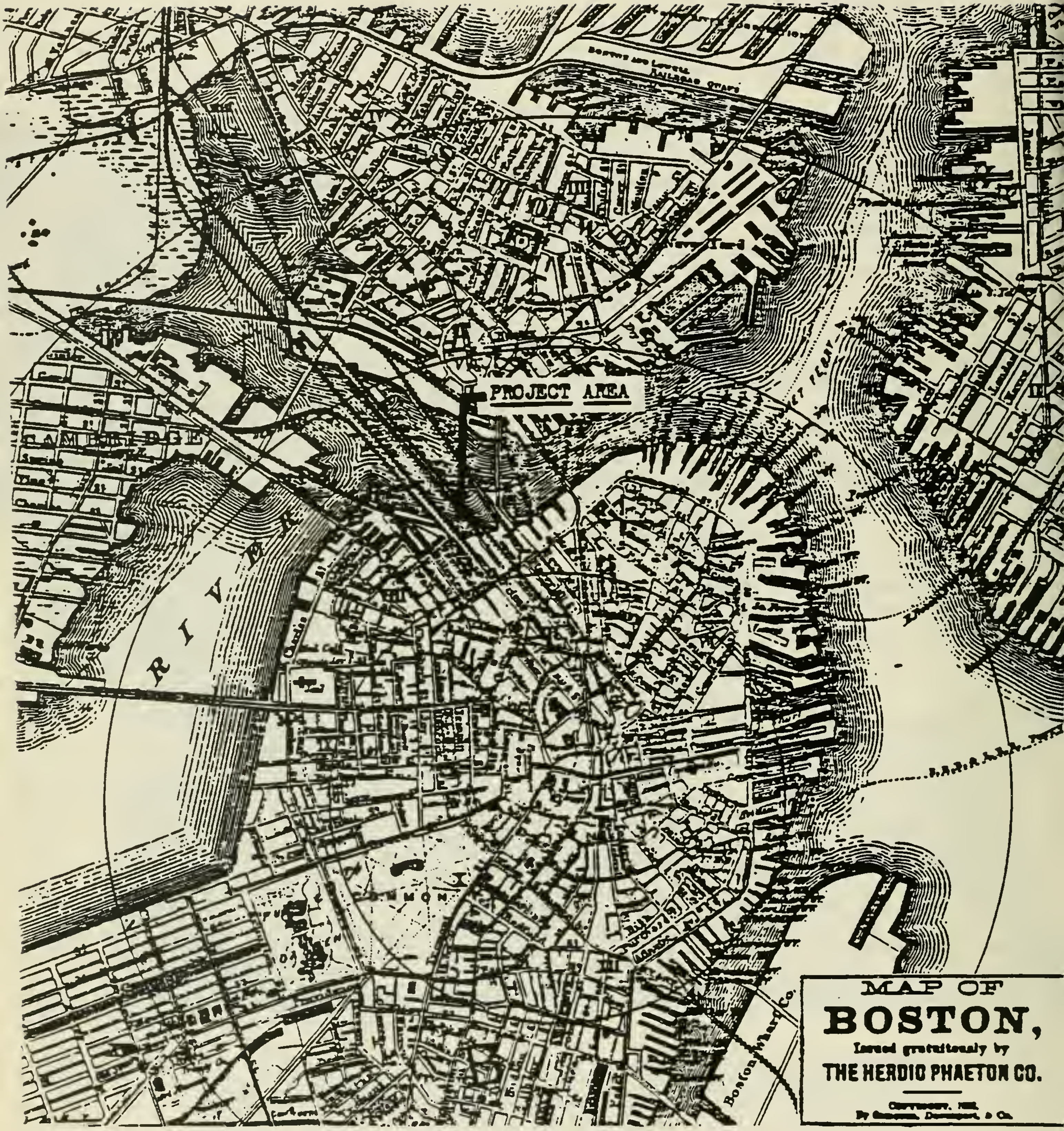

Figure V-5: NORTH STATION PROJECT AREA - 1882
(Campson, Davenport & Co.)

instituted on June 1, 1912. However, surface trackage over the Charles River Dam roadway was retained for emergency and night use until 1924. In 1928, a new North Station transit station was opened and in 1955, the Science Park station was completed above Leverett Circle, providing rapid transit service to patrons of the new Science Museum.

Also in 1928, the Union Station was replaced by a large-scale development along Causeway Street that included a new terminal named North Station, designed to provide modern and enlarged facilities for the B&M, together with a coliseum and sports arena (Boston Garden) located above the station concourse, an attached 500-room hotel - The Manger (later the Madison) Hotel - and the North Station Industrial (Analex) Building. Nearby, on Nashua Street, the Massachusetts DPW Building was erected in 1932, and by 1938 the present shoreline north of Nashua Street was fixed, completing the filling begun a century earlier (Figure V-6). The final major change to the area resulted from the construction of the Central Artery and the Storrow Drive connector ramps to Leverett Circle in 1953, which established the present-day form of the North Station area.

During the 1950's and 1960's, the railroads severely declined, and as a result half the tracks at North Station were removed and the remaining tracks were cut back from the station building to the expressway ramp. The Railway Express Agency went out of business and its freight forwarding facilities were demolished. The large vacant areas created by these actions were sold off and converted to surface parking lots. In 1976, the Madison Hotel closed due to low occupancy resulting from outmoded accommodations and a decline in train travel.

The urban renewal of the adjacent West End and Government Center areas, began in the early 1960's, had little impact on the North Station area. With the exception of the Massachusetts Rehabilitation Hospital, which located on a vacant site between Nashua Street and the river in 1969, nothing new has been built in the area, while at the same time several residential and commercial structures in the blocks between Nashua Street and Lomasney Way (formerly Lowell Street) have been demolished and replaced by the parking lots. Removal of the Orange Line elevated structure in 1975 and the recently-completed construction of the new Charles River Dam (following the alignment of the old Warren Avenue Bridge), however, represent public investments which are beginning to change the negative image of the area.

2. Archaeological and Historical Resources

According to the Massachusetts Historical Commission (MHC), no potential archaeological resources are expected to be found in the North Station project area, since this area is almost entirely filled land.

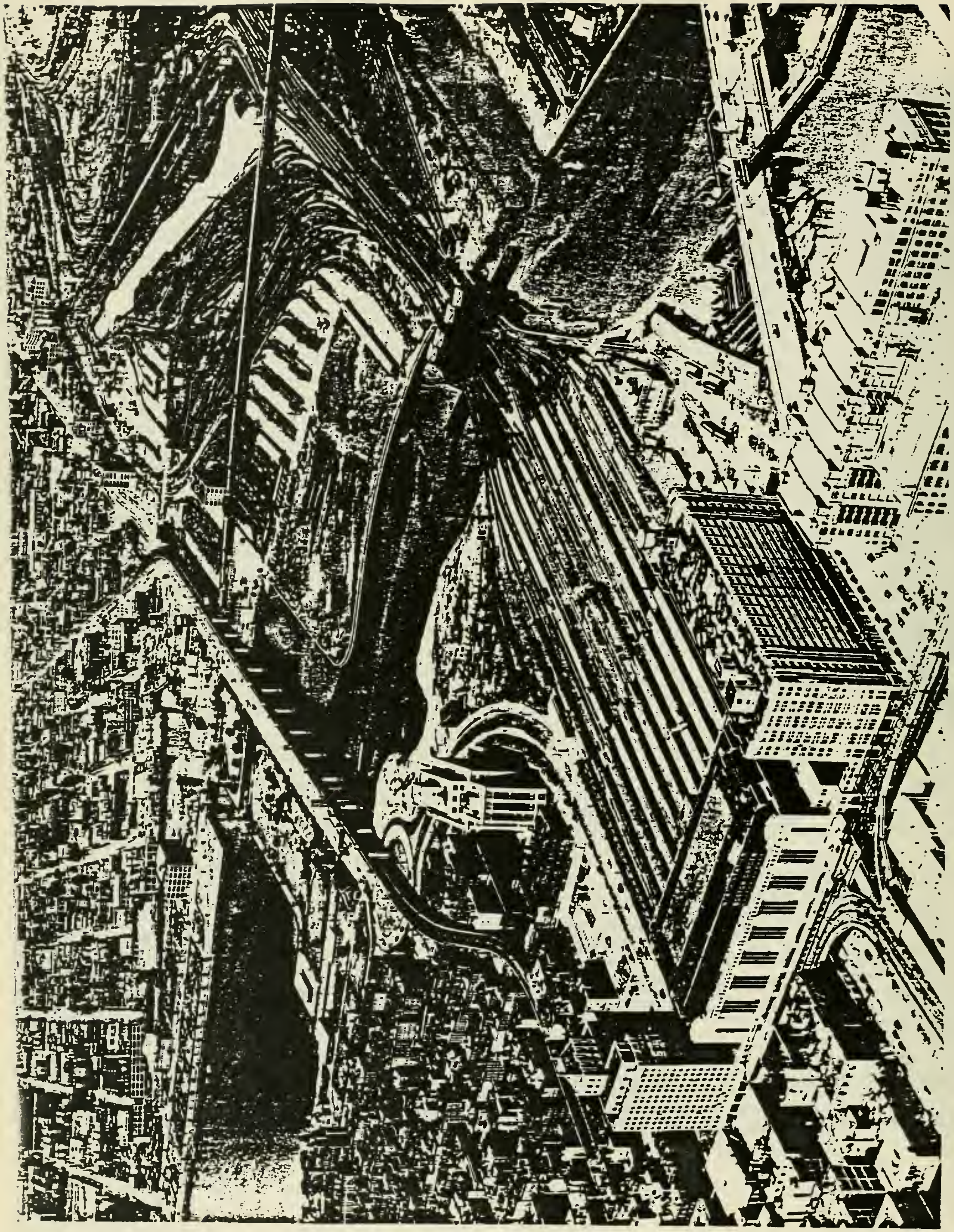

Figure V-6: NORTH STATION PROJECT AREA - 1947

The only identified historic resources within the project area are the old Charles River Dam and Green Line Viaduct over the Charles River, both of which are included in the Charles River Basin National Register District. The Charles River Dam was constructed between 1903 and 1910 by the Metropolitan Park Commission (now the MDC) under the direction of George A. Kimball, chief engineer. Prior to its recent replacement by the new Charles River Dam, the old dam controlled the water level of the Charles River Basin by excluding harbor tides from the water body upstream of the structure and included a lock, with attendant buildings, to allow the passage of both pleasure and commercial boats.

Adjacent to the dam, on its eastern (downstream) side, is a monumental viaduct, erected in 1910-11, by the Boston Elevated Railway Company, to carry street car tracks from Boston to Cambridge. Designed by Robert S. Peabody of the Boston architectural firm of Peabody and Stearns, the viaduct was intended to provide a suitable visual termination to the eastern end of the Basin and to mask the unsightly railroad yards and wharves downstream. The viaduct is constructed of reinforced concrete with a steel frame, 1,738 feet long and 31 feet wide. Ten arches rest on granite piers in the bed of the river. The span opposite the lock in the dam incorporates a single-leaf steel draw, controls for which are located in a concrete tower atop the viaduct. The piers at each end of the viaduct rise above the parapets and incorporate the date of construction - 1910 - in relief.

The Massachusetts Historical Commission has surveyed the North Station area but has not identified any other site or structure of any historic significance. However, the Commission has identified a portion of the adjacent Bulfinch Triangle Area (that area bounded by Causeway, Merrimac, and Canal Streets) as eligible for listing in the National Register. This district includes approximately half of the triangular street pattern laid out by Charles Bulfinch in 1808 in the former Mill Pond. Because of its proximity to the later railroads, the Bulfinch Triangle developed as a center for manufacturing and wholesale dealers, particularly in the furniture trades. The architecture of the area is diverse, with the most distinctive structures generally being 4- to 6-story late 19th century brick warehouses in the Richardsonian Romanesque and Victorian Commercial styles.

Although neither the North Station/Boston Garden complex nor the Madison Hotel are considered eligible for National Register listing by the MHC, these two buildings were surveyed as part of the Boston Landmarks Commission's Central Business District Preservation Study and were found to exhibit some importance (see Figure V-28(a) infra). North Station/Boston Garden in particular, built in 1927-28, was considered by the survey to be a notable early example of the Art Deco style which continues to serve its original function as a railroad terminal and coliseum. Designed by Fellheimer and Wagner (N.Y.C.) and Frank and Wilcox (Boston), the structure is 6 stories in height and is constructed of yellow brick and yellow cast stone trim. Notable features include the ground floor walls recessed behind wide brick arches ornamented with Chevron banding and storefronts and doorways framed with Art Deco metal trim. The upper floors feature rising piers separating wide multi-story blue opaque glass windows.

The Madison Hotel, which opened in 1930, was considered a "respectable", but not striking, example of the Moderne Style matching the adjacent North Station in style and material.* Built of yellow brick and terra cotta, the Madison is 15 stories in height (plus two recessed stories above) and exhibits some yellow terra cotta Art Deco patterning above levels 2 and 3 and 14 and 15. Like the North Station, the ground floor walls also are set back behind rising brick piers to create a covered arcade.

The MHC also examined the Green Line elevated structure for its potential for National Register listing. Based on their review, it was determined that the structure did not exhibit any unique, unusual, or innovative structural or engineering features, was not related to any extensive and significant elevated railroad developments of the 19th century, and thus did not appear to meet the National Register criteria (see Appendix Q-3).

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* However, the Advisory Council on Historic Preservation, in its preliminary findings on properties potentially suitable for Federal acquisition and use, found that the Madison was of a style unusual for Boston and was of some architectural value. (Advisory Council on Historic Preservation, "Preliminary Finding - Properties Which May Be Suitable for Federal Acquisition and Use under the Public Buildings Cooperative Use Act (P.L. 94-541) Boston, Massachusetts," Appendix J of General Services Administration, Public Buildings Service, Final Environmental Impact Statement, Proposed New Federal Office Building-Boston, Suffolk County, Massachusetts (EMA 78002), Boston, July, 1980, p. 548.

B. Project Area Profile*

1. Land Use and Development

1.1 Existing Land Uses and Zoning

Land Use

Existing land use in the North Station Urban Renewal Project Area is shown on Figure V-7 and the acreage allocated to the various uses on Table V-1.

The predominant land use is auto-related (59% of the total project area) - 28% for streets and 31% for parking lots. The remaining land area is occupied (17%) or in open space (9%). Fifteen percent of the project area is within the Charles River.

The predominant developed land use is semi-public in nature. The Boston Garden, Massachusetts Rehabilitation Hospital, and Registry buildings total 6.65 acres (13% of the project area). Commercial land uses (.72 acres) include the vacant Madison Hotel and a few one- to two-story structures on Nashua Street, Causeway Street, and Lomasney Way. Mixed residential/commercial land uses (.31 acres), residential land uses (.40 acres), and utility-related industrial buildings (.5 acres) occupy the balance of the developed area, primarily along Billerica Street.

Sub-Area I

Sub-area I encompasses approximately 13.66 acres. The predominant land use is auto related: 71% of the area is currently allocated to streets and parking lots. There are seven parking lots with a total parking capacity of 605 spaces, occupying 32% of the area. Streets and other rights-of-way account for 39% of Sub-area I. The major public streets include Lomasney Way, Nashua Street, and Causeway Street. Local streets include Billerica and Cotting Streets, and there is one private street, Accolon Way.

A third, related land use (2.03 acres) is of a semi-public nature: the Boston Garden Building. This facility includes, on the first floor, a concourse for the MBTA North Shore commuter rail, which also provides access and service functions relating to the auditorium function of the Boston Garden. To the rear of the Garden is a public pedestrian way which connects to the track area (.57 acres).

Residential and local commercial land uses account for 10% of Sub-area I. Commercial uses are located primarily in four one-story commercial structures in the Billerica Street section and in the

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* All data in this section are based on conditions existing prior to initiation of property acquisition and site preparation activities for the GSA Federal Office Building in March of 1982.

NORTH STATION
REDEVELOPMENT
PROJECT

BOSTON REDEVELOPMENT AUTHORITY

EXISTING LAND USE
(1982)

Figure V-7

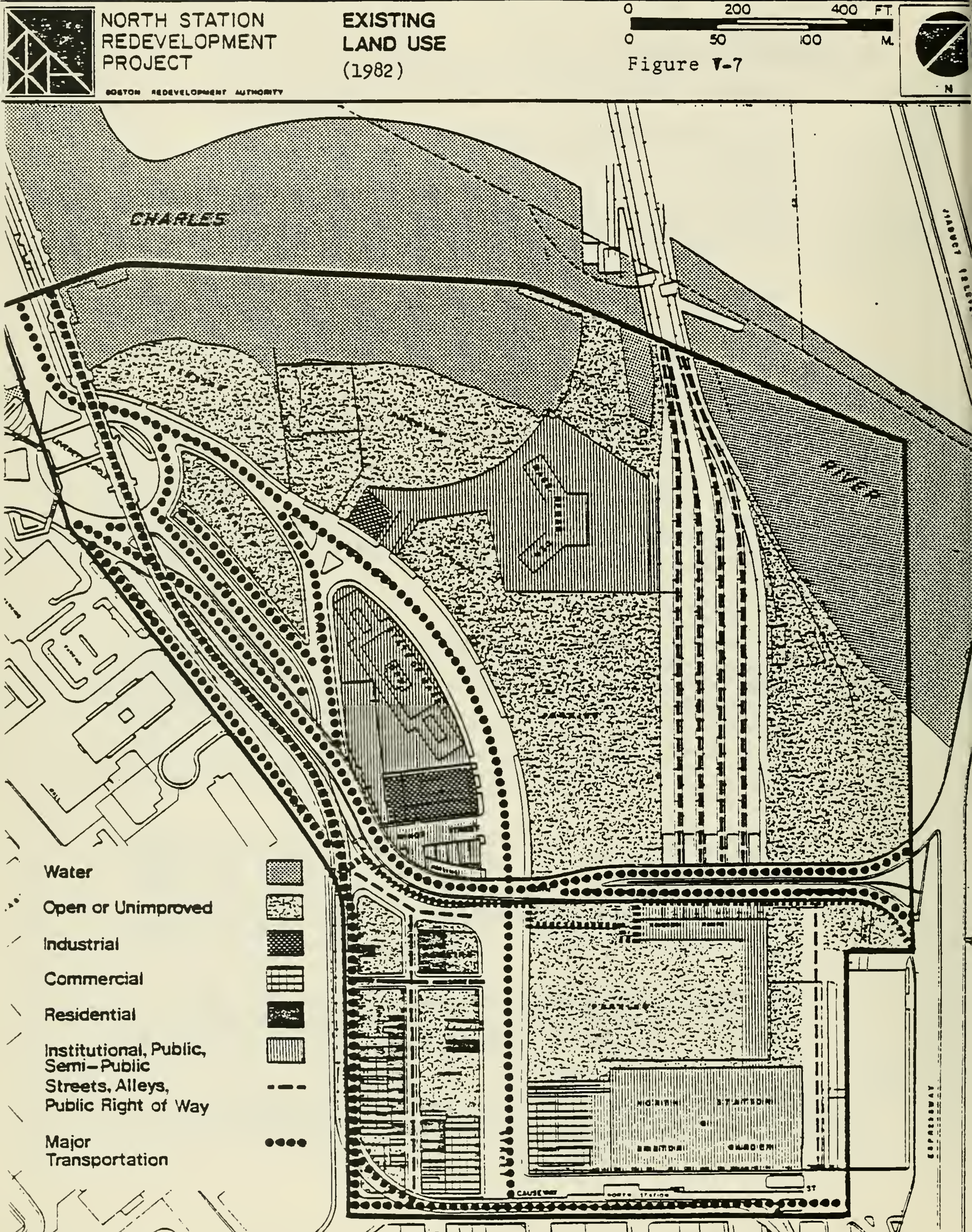

Table V-1

North Station Urban Renewal Area

EXISTING LAND USE

USE	Sub-Area I SQ.FT.	Sub-Area I ACRES	Sub-Area I %	Sub-Area II SQ.FT.	Sub-Area II ACRES	Sub-Area II %	Total SQ.FT.	Total ACRES	Total %
Residential	17,424	.40	3				17,424	.40	.8
Commercial	31,363	.72	5				31,363	.72	1.5
Mixed Residential/ Commercial	13,504	.31	2				13,504	.31	.6
Semi-Public*	113,256	2.60	19	176,418	4.05	11	189,674	6.65	13.4
Utility				21,780	.50	1	21,780	.50	1.0
Railroad				180,338	4.14	12	180,338	4.14	8.4
Parking	186,001	4.27	32	480,031	11.02	31	666,032	15.29	30.8
Streets	233,481	5.36	39	373,510	8.57	24	606,991	13.93	28.1
Charles River				313,432	7.20	20	313,432	7.20	14.5
Other Open Space				19,602	.45	1	19,602	.45	.9
TOTAL	595,029	13.66	100	1,565,111	35.93	100	2,160,140	49.59	100

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* North Station/Boston Garden, Registry, Rehabilitation Hospital

now-vacant Madison Hotel. Mixed residential/commercial uses are located in 12 row structures on Lomasney Way. There are also a total of 18 residential structures occupying approximately 3% of Sub-area I and less than 1% of the total project area.

Sub-Area II

Sub-area II includes approximately 35.93 acres. The predominant land use likewise is auto-related (55% of the area). There are eight parking lots with a total capacity of 1,727 spaces, and these occupy 31% of the area. A helicopter landing pad is located on a DPW parking lot adjacent to the Charles River. Major public rights-of-way account for 24% of the land area. The ramps from the Central Artery to Leverett Circle, Leverett Circle, and Martha Road account for most of these rights-of-way; other streets include Nashua and Lowell.

The MBTA rail yards and track area serving the North Station total some four acres. Within this right-of-way are 10 tracks which directly serve North Station. Two additional spur tracks, one of which serves the Stop and Shop Bakery, also tie into this right-of-way.

Semi-public institutional uses, which account for 11% of the sub-area, are found in three buildings - the Massachusetts Registry of Motor Vehicles (and a small parking garage) and the Massachusetts Rehabilitation Hospital (a private facility).

The area of the Charles River which has been included within the boundaries of the project area (from the southern bank to its center line) covers some 7.2 acres. An adjacent undeveloped area of embankment owned by the Rehabilitation Hospital covers about one-half acre.

The last land use is industrial (utility) and covers some .5 acres. A large facility which lies adjacent to the Registry Building is owned by Boston Edison and provides steam pressure to Massachusetts General Hospital in particular. The second building, adjacent to the entrance of the Rehabilitation Hospital, contains a transformer which provides electrical service to the MBTA North Shore commuter service. Two smaller utility buildings are located on the edge of the Rehabilitation Hospital parking lot.

Zoning

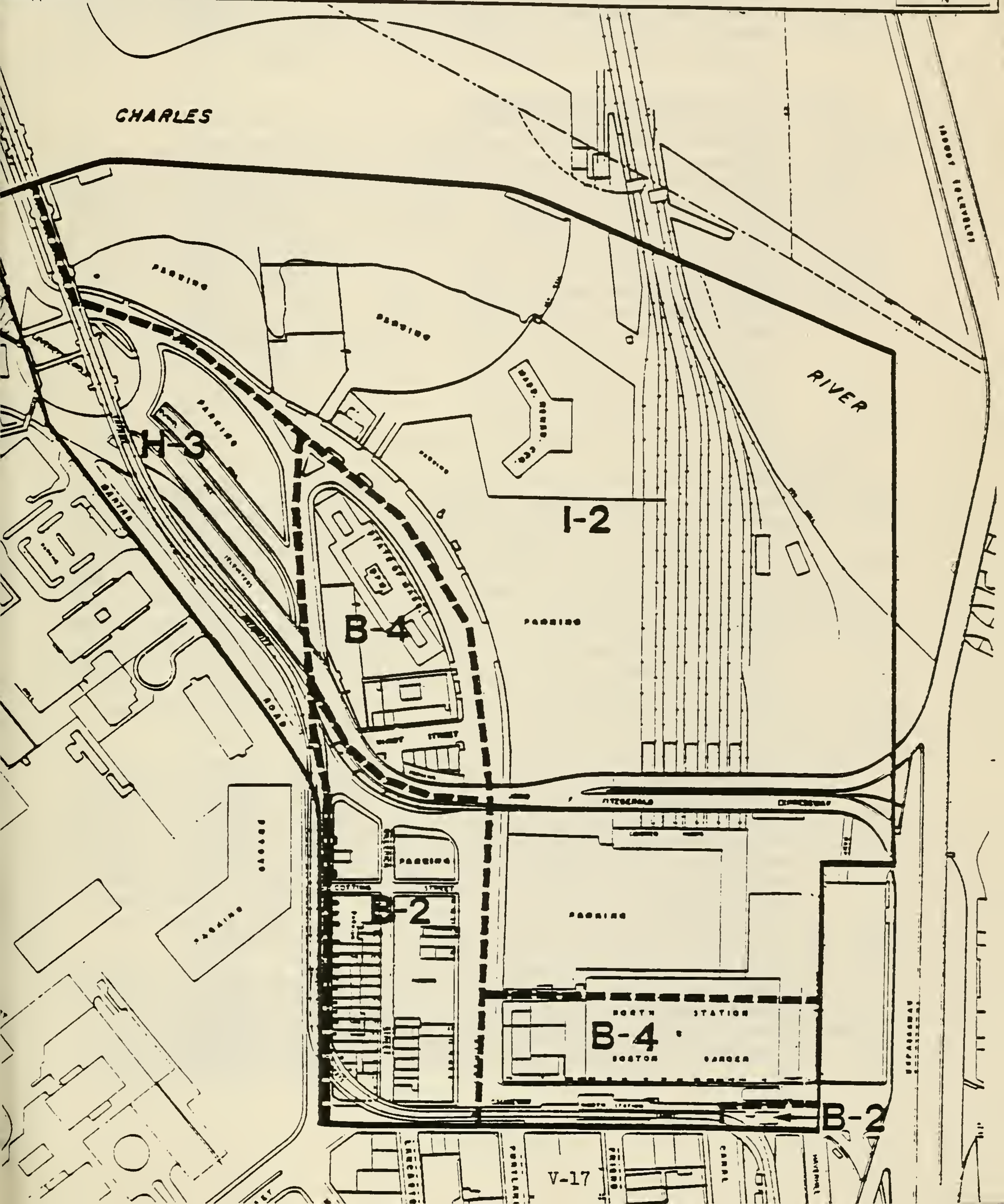
Existing zoning in the project area is shown in Figure V-8 and is primarily commercial and industrial in nature, with a floor area ratio which ranges from 2 to 4. The existing zoning designations are General Business in the area along Causeway Street and in the blocks between Lomasney Way and Nashua Street; General Manufacturing in the area north of the North Station building and east of Nashua Street; and Residential (apartments) west of Lomasney Way. Within

NORTH STATION
REDEVELOPMENT
PROJECT
BOSTON REDEVELOPMENT AUTHORITY

EXISTING ZONING

0 200 400 FT
0 50 100 M

Figure V-8



the General Business district retail uses, service establishments, offices and passenger railroad and bus stations are permitted uses; and the Industrial zone includes wholesale businesses and storage, rail yards, and most industrial uses, except those objectionable or offensive because of special hazards, odors, smoke, fumes or similar nuisances.

1.2 Project Area Conditions

As noted above, the vast majority of the North Station project area is devoted to open land and rights-of-way; only 8.6 acres, or 20.2% of the total land area (excluding the Charles River), is developed with structures. There are a total of 43 buildings in the project area, of which 36 buildings, or 84%, are located in Sub-area I. The major buildings in this sub-area - the North Station/Boston Garden building and the Madison Hotel - are of concrete frame and pile construction and stand between 6 and 17 stories in height. The Billerica Street blocks contain one- and two-story commercial buildings and three- to four-story rowhouses, primarily of brick construction. Only seven structures are located in Sub-area II, including the stone-faced Registry building and the brick-faced Rehabilitation Hospital, both of which are 10 stories high, and a 2-story Edison steam booster plant. The remaining buildings are one-story utility and garage structures.

Based on exterior building and environmental surveys undertaken by the Boston Redevelopment Authority, the North Station project area was found to be a substandard and decadent area, with Sub-area II determined to be a blighted open area as well. Of the 43 buildings in the total project area, 14, or 32.6%, were found to contain major or substantial intermediate defects and thus were considered to be substandard in condition. In addition, another 14 buildings suffer from environmental deficiencies due either to blighting conditions resulting from the location of the structure or use (e.g. conversion to incompatible types of uses, obsolete building type) or as a result of the blighting impact of external environmental factors (e.g. detrimental adjacent land uses).

Sub-area I suffers particularly from the noise, blight, and visual and barrier effects of the Green Line elevated tracks, the elevated Central Artery, and the Storrow Drive Connector ramps, all of which have inhibited any substantial development in the area for several decades. The North Station/Boston Garden building and the Madison Hotel form a wall along Causeway Street, yet function as isolated buildings on the south side of the river. The Madison Hotel has been closed and in tax arrears for over four years, a significant example of the area's decline given its primary location.

The Billerica Street blocks, once a distinct and cohesive residential area (the last remaining section of the old West End) has suffered from a number of conversions from residential to commercial or family residential to small apartment units and from a high vacancy rate (43%). Continual deterioration and lack of maintenance has resulted in the demolition of several buildings in this small neighborhood for surface parking, resulting in a patch-work mixture of parking lots, commercial signs and residential uses. In addition, these blocks are surrounded by serious traffic congestion at peak hours and during events at the Boston Garden.

Sub-area II likewise has a negative image and no visual coherence. Noise and air pollution from the Artery and ramps and from the diesel engines at North Station adversely affect the site, as does the visual disruption of the Artery structures and railroad bridges. Perception of the Charles River is virtually non-existant from Nashua Street, and the river bank and new Dam are almost entirely inaccessible to pedestrians. The riverfront itself is devoted almost exclusively to parking lots and railroad tracks, and the edge is overgrown with weeds. Only 16% of the land area of Sub-area II is built up, the remainder being devoted to transportation uses (streets, surface parking and tracks). This sub-area does contain the project area's most recent building - the Massachusetts Rehabilitation Hospital - built in 1969.

1.3 Charles River

Approximately 7.2 acres of the urban renewal area is water area of the Charles River. The Charles River, the longest of the three Metropolitan Boston rivers, originates some 26 miles southwest of Boston in the town of Hopkinton and meanders for approximately 78.9 miles to its mouth at Boston Harbor (the Indian name for the Charles was Quinobequin, which means twisting or winding). The lower portion of the river is known as the Charles Basin and is an approximately 9.8 mile long impoundment of the river extending eastward from the Watertown Dam to the (new) Charles River Dam in Boston. The Charles Basin was originally created in 1910 with the completion of the old Charles River Dam and was extended, by Chapter 550 of the Acts of 1962, to the location of the new dam.

Prior to 1910, the river below the Watertown Dam was a tidal estuary exposing unsightly and maladorous marshes at low tide. The Charles River Dam was constructed to eliminate the tidal fluctuations and sewerage odors and to establish attractive areas for recreation purposes. However, this dam created more problems than it was intended to solve, and in 1978 a new Charles River Dam, some 2,200 feet below the old, was completed for flood control, increased boat traffic, and control of salt water intrusion. The new dam became fully operational in February, 1981.

The Charles Basin more closely resembles a lake than a river, especially in its lower quarter, where its maximum width is 2,200 feet. Within the project area the Charles generally varies in width (shore to shore) from 360 feet to approximately 600 feet, although it is narrowly constricted at the commuter rail crossing. Depth varies between 12 and 24 feet. Basin elevation is normally maintained by the (new) Charles River Dam at 2.35 feet above mean sea level (MSL).

Immediately north of the project area, adjacent to the railroad tracks, is the Millers River Basin, a minor tributary to the Charles, flowing from Somerville and Cambridge.

Between the old and new dams, the river is crossed by two bascule draw bridges carrying four rail tracks into North Station (the tracks diverge before terminating at the station). Approximately 400 feet southeast of these bridges the MBTA Orange Line subway tunnel passes beneath the river.

In this part of the Basin, the river is used primarily as a passage from the Basin to the Harbor for sailboats and the large number of power boats which are moored in the Basin. The river also serves, in a more limited fashion, some commercial boating (principally oil barges) with destinations to waterfront facilities located along Broad Canal and Lechmere Canal in Cambridge. Because of its highly degraded water quality, the river here is not used for any recreational purposes (other than boating) or water contact sports, nor for fishing.

1.4 Open Space and Recreation Facilities

Other than the Charles River Basin, there are no public open spaces or recreation facilities within the North Station project area. However, immediately adjacent to the area, at the new Charles River Dam, is a small landscaped pedestrian and parking area on MDC property, a part of the larger, 8.5 acre, Paul Revere Landing Park which extends across the dam into Charlestown. A pedestrian path borders the parking area and runs a short distance along the Boston edge of the Charles River.

Located nearby are major MDC recreational facilities. To the west, along the banks of the Charles River, is the 100+ acre Esplanade and Charlesbank Park containing extensive grassed sitting areas, walking and bike paths, tennis courts, a softball field, tot lots, the Lee Memorial swimming pool, the privately-operated Community Boating facility, and the Hatch Memorial Shell. Approximately three blocks east is an MDC skating rink and playground and the City-owned North End Park, a 3.6-acre facility with a swimming pool and bathhouse, ball fields, bocci courts, and other recreational areas adjacent. The MDC recently expanded its parkland along the waterfront to a new park area with tennis courts, at the corner of Commercial Street and the Charlestown Bridge.

1.5 Property Ownership

The major property owners, in terms of land area, are public and semi-public agencies and institutions - the Massachusetts DPW, MDC, MBTA, City of Boston (Real Property), the Massachusetts General and Massachusetts Rehabilitation Hospitals and the New Boston Garden Corporation - which together own 80% of the total project area exclusive of rights-of-ways and the river. The remaining property, generally small parcels of less than 2,000 sq.ft., are owned primarily by individuals or small businesses.

Land ownership in the project area is, however, a complex issue. Since nearly all of the area was once a part of the Charles River, title originally was held by the English Crown and subsequently was passed to the Massachusetts Bay Company. Under the 1643 grant by the town of Boston of the North Cove, the salt marshes and flats on either side of the causeway were granted to Henry Symonds and partners and eventually passed to the Boston Mill Corporation and other private partners. Title to the submerged lands (those land lying below the low water mark), however, was retained by the Colony and, following the Revolution, by the Commonwealth. During the mid-19th century, the several railroads entering the present-day North Station area were granted easements and rights to construct or widen rights-of-way and bridges over the Charles River by separate Acts of the General Court. In 1872, the Legislature granted to the Board of Harbor Commissioners, which had been established in 1866 and empowered with general supervision and care of all the harbors, tidewaters, and flats and lands flowed thereby (with the exception of the Back Bay lands), the authority to license structures in tidewater lands, the building or extension of wharves and piers, and the filling of lands and flats. Subsequently, the extension of the railroad property by land-filling into the river area, the construction of sea walls, and the addition of rights-of-way were governed by licenses issued first by the Harbor Commissioners and later by their successors (today the Division of Waterways of DEQE).

By Chapter 432 of the Acts of 1869, the rights of the Commonwealth in tidewater lands is protected and all licenses granted by the Commonwealth are revocable at any time, unless made irrevocable by a special act (the Massachusetts courts have held, however, that Acts of the Legislature prior to 1869 did operate as grants - but with a condition subsequent that the use be for a public purpose - and not as mere revocable licenses). In 1962, for example, the Legislature made irrevocable a license granted to the Boston and Maine Railroad involving the railroad's property in the North Station project area (Chapter 691).* In addition, many of the parcels are subject to highway easement rights of the Commonwealth for the construction of the Storrow Drive Connector, as well as to surface and subsurface easements of the Boston and Maine Railroad, Western Union, City of Boston and MDC sewers, and other utilities.

Within the Leverett Circle area in particular land holdings are quite intricate. Streets and land parcels are owned variously by the MDC, DPW, and the City of Boston; the Nashua Street approach to the Circle, for instance is subdivided between MDC and DPW ownership, as is an adjacent parking lot, a result of convoluted land takings. Moreover, the MBTA owns the Green Line elevated easement and the Massachusetts DPW the Storrow Drive Connector easement while the MDC holds a sewer easement through a DPW parking lot.

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* For a more detailed discussion of the Commonwealth's title to property in the North Station project area and the rights of public access, see the response to EOEA's comment number 33 in Part VIII and Appendix R.

The Charles River itself is owned by the Commonwealth and within the North Station area is legally defined as part of the Charles River Basin (Section 2 of Chapter 550, Acts of 1962). The exclusive care and control of the Basin was given, by Chapter 524 of the Acts of 1909, to the Metropolitan Park Commission (now the Metropolitan District Commission).

2. Demographic Profile

The residential population of the North Station project area consists of 68 households, containing approximately 106 persons, most of whom reside on Billerica Street with a smaller number on Lomasney Way and Nashua Street.(1) Household size is generally small; household composition includes 41 single persons, 16 families, and 11 joint households (unrelated individuals). Only six families have children.

There is a significant number of older residents in this small enclave. The median age is estimated at 50 years, and 18 households have one or more elderly members (aged 62 or over). The ethnic composition of the households is primarily Italian, Irish, and Polish, particularly among the older residents. Minority occupancy is estimated to be not more than 5%.

Occupational information indicates that approximately 26% of the households are considered to be low-income, 35% moderate-income, and the remainder middle income. The primary type of occupation for those not retired fall within the clerical-administrative, service, and restaurant-related job categories.

Sixty-one percent of the households have lived in the area for four or more years. Several families are long-term residents, with seventeen households having lived in the area for twenty years or more, and another four have resided for at least forty years. A number of the present occupants were former West End residents (29% of the households), and many have a strong sense of neighborhood.

3. Transportation Facilities

3.1 Street and Highway Network

A number of the region's major expressways converge in or adjacent to the North Station area. Interstate Route 93 (John F. Fitzgerald Expressway, or Central Artery) is a major highway immediately to the east of the North Station Project. I-93 extends to the northwest and south reaching the outlying population centers of the region. Access ramps to and from I-93 south are located just east of the North Station Urban Renewal Area along Causeway Street and at Leverett Circle in the northwest corner of the project area. Access to and from I-93 north is also located at Leverett Circle as well as via the North Washington Street Bridge to the City Square/Charlestown ramps. The Tobin Bridge and its connections to the Northeast Expressway provide a direct route to the north and northeast, again via the Leverett Circle and City Square ramps. Access to the west is via Storrow Drive/Soldiers Field Road, which converge on North Station at Leverett Circle, and via the Massachusetts Turnpike, which meets I-93 about two miles south of the Causeway Street ramps. The Sumner/Callahan Tunnels provide direct access to Logan International Airport as well as the northeast suburbs. They are located just south of the North Station Project and are accessible from either the Central Artery or local streets.

The principal local streets serving the North Station area are Causeway Street, a major east-west street in front of North Station and the Boston Garden, providing access to North Washington Street and Commercial Street to the east and to Merrimac, Staniford, and Cambridge Streets and Lomasney Way and Nashua Street to the west; and Nashua Street, Lomasney Way/Lowell Street, Merrimac Street and North Washington Street, which provide generally north-south access to the North Station area with connections to Leverett Circle, Cambridge, and Charlestown to the north and Haymarket Square, Government Center and Downtown to the south. The existing street and highway network is shown on Figure V-9.

Causeway Street, between Nashua Street and the Central Artery, is a seven-lane (four lanes eastbound, three lanes westbound), median-separated, two-way arterial which, in 1980, carried approximately 25,880 vehicles per weekday. Merrimac Street, Lomasney Way, and Martha Road presently handle approximately 6,000 vehicles each on an average weekday. Nashua Street, from Causeway Street to Lowell Street carries two-way traffic with an average weekday volume of 20,000 vehicles; between Lowell Street and Leverett Circle, Nashua Street is one-way northbound.

Traffic volumes on major project area streets and streets servicing the North Station area, for P.M. peak hours, 8-hour peak, and average weekday, are indicated on Table V-2 and Figure V-10.

Levels of service within the project's traffic study area - defined as the urban renewal area and adjacent areas within a perimeter of Merrimac Street/Lomasney Way/Martha Road, the Charles River, North Washington Street, and New Sudbury Street (Figure V-11) - are indicated in Table V-3 and Figure V-12 and range from A at five of the intersections to E at Keany Square (North Washington and Causeway Streets).* Traffic congestion at major intersections is most acute during peak hours but can occur at mid-day as well as before and after major Garden events. In addition, Leverett Circle and the Central Artery on-ramps from Storrow Drive and Causeway Street are seriously impacted whenever the Artery itself is overcapacity, and this congestion spreads to the local surface street system within and adjacent to the project area.

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* Levels of service are based on volume-capacity ratios according to the Highway Capacity Manual (Highway Research Board, 1965). Levels range from A to F, with A representing free-flow traffic and excellent service conditions and F representing forced flow, stop-and-go traffic and jammed conditions. Urban traffic conditions are considered acceptable if they are at LOS C or better.

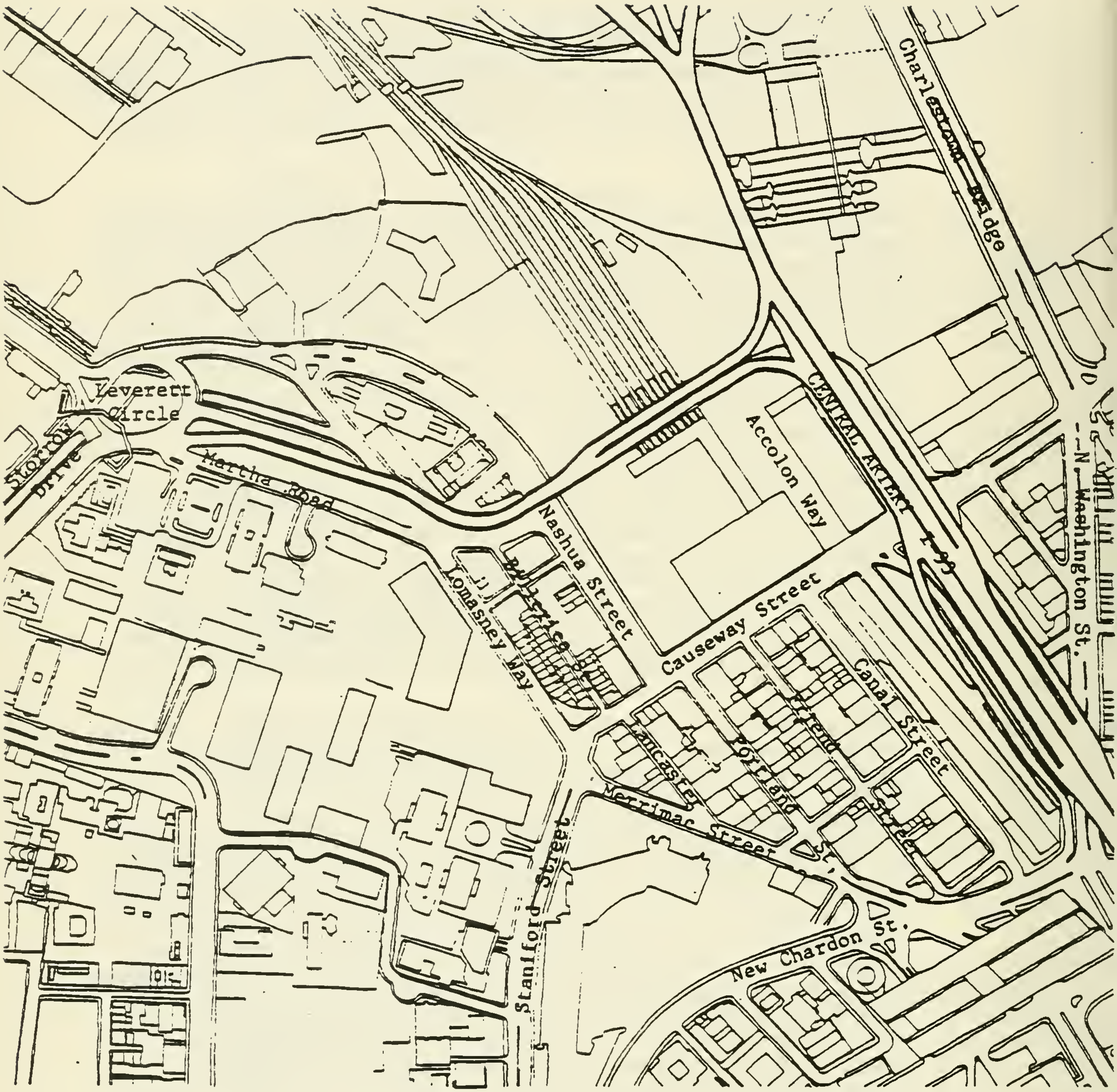


FIGURE V-9: EXISTING NORTH STATION ROADWAY SYSTEM

Table V-2

NORTH STATION URBAN RENEWAL PROJECT

Traffic Volumes on Major Project Area Streets and Access Roadways (1980)

Street	P.M. Peak (5-6 p.m.)	8-hour Peak (10 a.m.-6 p.m.)	AWDT
Central Artery (Northbound)	4,400	45,635	71,700
(Southbound)	3,140	34,295	69,000
Storrow Drive Access Ramp (On)	2,754	22,129	46,440
(Off)	2,460	23,510	47,300
Storrow Drive (Eastbound)	2,850	19,182	45,190
(Westbound)	2,786	23,311	51,897
Causeway Street	1,452	11,480	25,880
Nashua Street	1,555	11,806	20,364
Lomasney Way	202	4,053	6,041
Martha Road	280	4,617	6,603
Charles River Dam (Northbound)	1,230	6,277	17,938
(Southbound)	1,008	9,260	21,542
Merrimac Street	546	4,371	5,712
North Washington Street	1,539	9,453	16,459
Canal Street	257	2,276	5,563

Source: BRA Transportation Planning Department

FIGURE V-10

AVERAGE WEEKDAY TRAFFIC NORTH STATION PROJECT

EXISTING (1980)

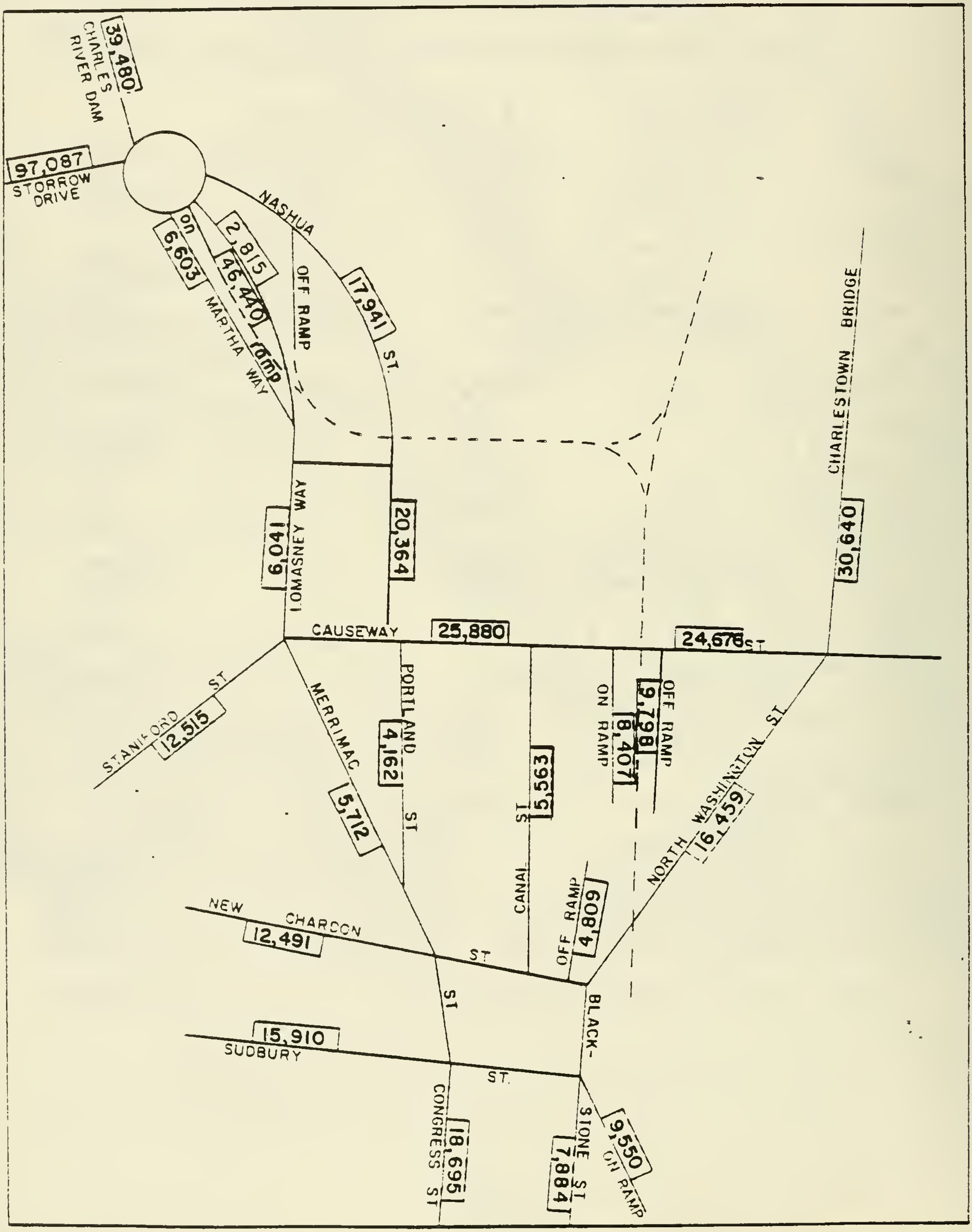


FIGURE V-11

NORTH STATION PROJECT TRAFFIC IMPACT AREA

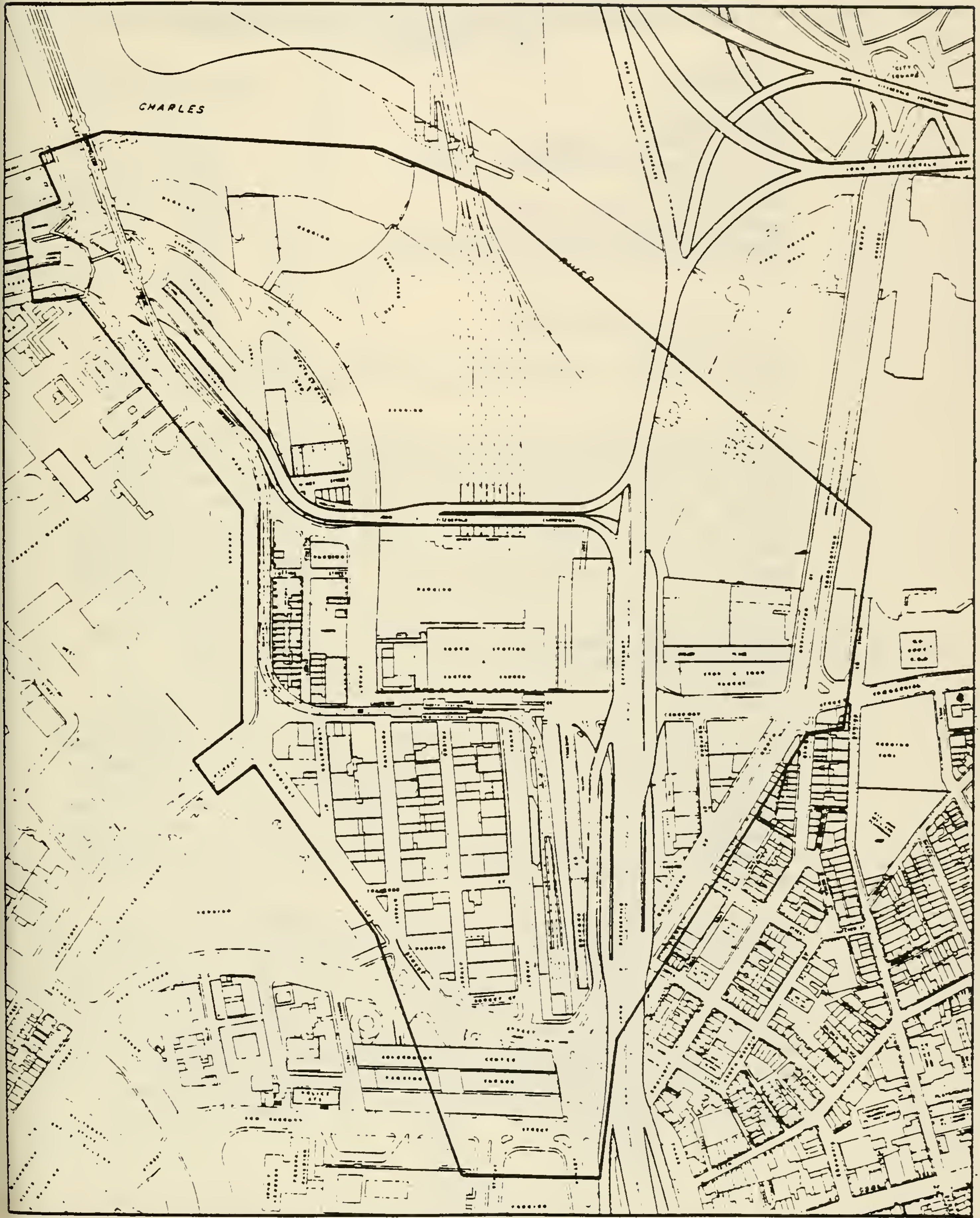


Table V-3

Levels of Service - North Station Traffic Study Area
(P.M. Peak Hour)

Intersection	Level of Service
Keany Square	E
Portland/Nashua/Causeway Streets	C
Merrimac/Staniford/Causeway Streets	A
Leverett Circle	A-D
Merrimac/New Chardon Streets	A
Merrimac/Sudbury/New Congress Streets	B
Blackstone/New Chardon/N. Washington Sts.	A
Blackstone/Sudbury Streets	A

3.2 Public Transportation

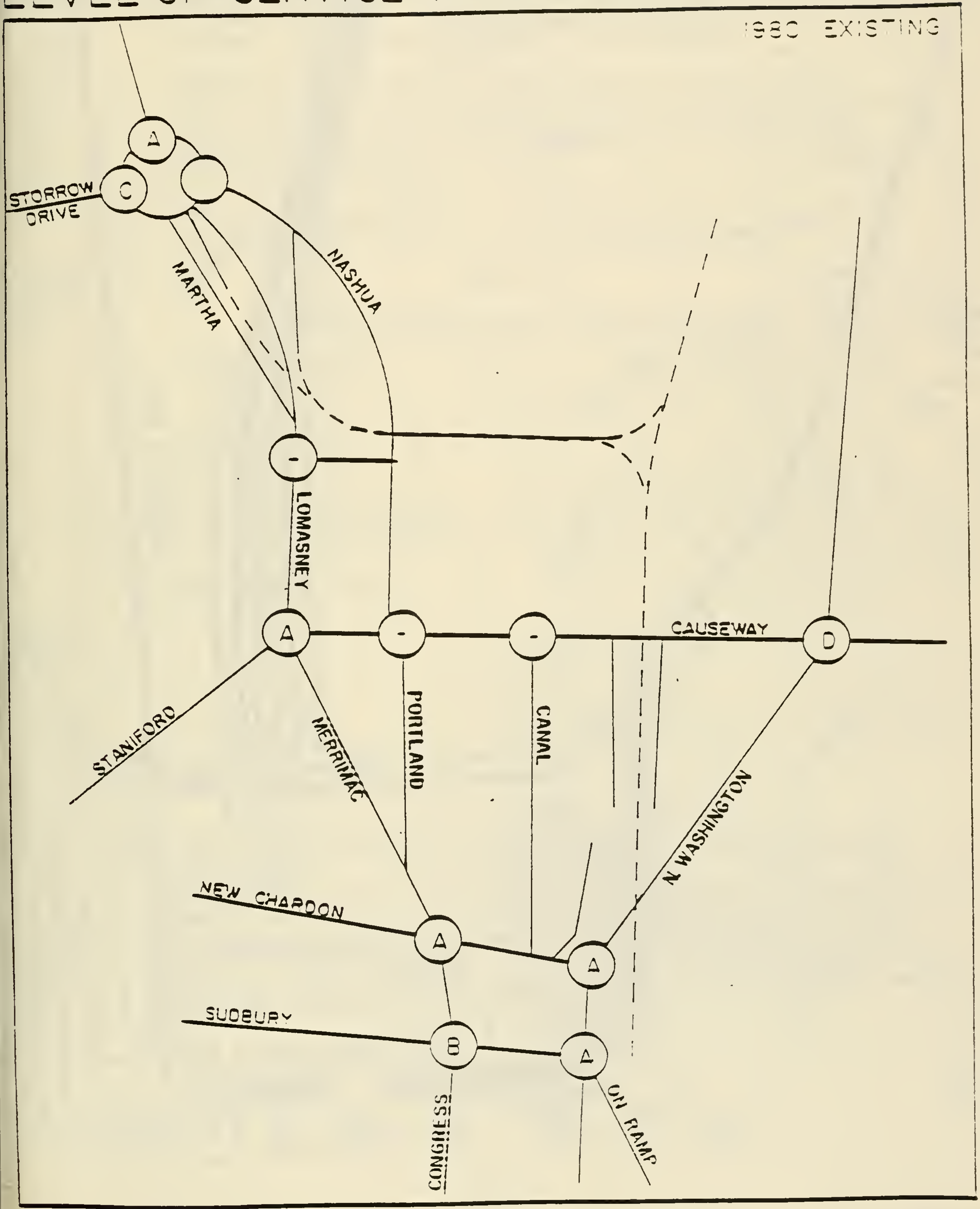
The North Station project area is currently served by two rapid transit lines and a major commuter rail terminal (Figure V-13).

The Orange Line heavy rail rapid transit line is located at the eastern edge of the project with a subway station at the intersection of Causeway Street and Canal Street and provides access north and south, between Oak Grove (Malden) and Forest Hills in Boston. A high capacity system (224-260 passengers per vehicle), the Orange Line operates with four-car trains in the peak hours and two-car trains in the off-peak hours. The Green Line, a light rail transit facility, traverses the southern and eastern edges of the North Station project on an elevated structure. Stations are located at Leverett Circle (Science Park), and at Causeway Street (North Station) immediately in front of the Boston Garden. An additional station is located at-grade at the intersection of Causeway and Canal Streets and is the terminus of the Green Line North Station loop. A total of 452 Green Line trains serve the North Station area in a 24-hour period. Three segments of the Green Line operate within or adjacent to the project area - the Boston College-Lechmere and Cleveland Circle-Lechmere lines and the Riverside-North Station line. Train headways are approximately 5-8 minutes during rush hours and 7-10 minutes at off-peak periods and on weekends. The Green Line, with lower capacity vehicles (130-219 passengers per vehicle), operates two-car trains in the peak-hours and single-car trains at other times.

The North Station commuter rail terminal is served by four lines, providing rail service to the northeastern, northern, and northwestern suburbs of Boston. These lines include 1) the Eastern Line, via Lynn, Salem, and Beverly, which has two northeasterly branches - one servicing Gloucester and Rockport and the other Ipswich; 2) the Merrimac Valley Line (Western Route), which serves communities from Melrose northerly to Haverhill; 3) the New Hampshire Main Line, serving communities northwesterly between West Medford and Lowell and 4) the Fitchburg Main Line, which serves communities from Cambridge to Gardner.

FIGURE V-12

PM PEAK HOUR LEVEL OF SERVICE ANALYSIS



NORTH STATION
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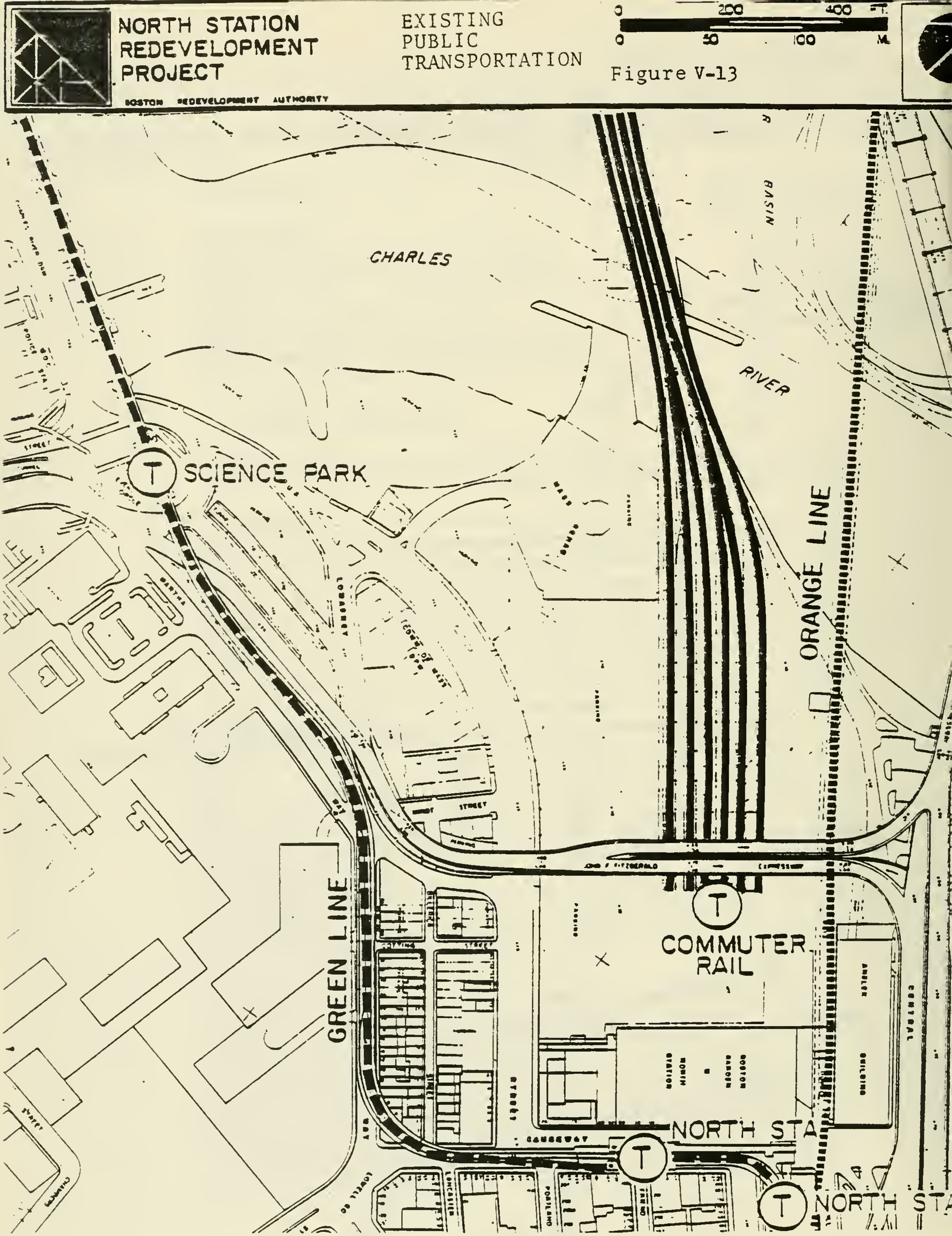
PROJECT

BOSTON REDEVELOPMENT AUTHORITY

EXISTING
PUBLIC
TRANSPORTATION

Figure V-13



Average weekday (24-hour) volume is 110 trains. During both the morning peak hours (7-9 a.m.) and the evening peak hours (4-6 p.m.), a total of 35 trains arrive at and leave from North Station. Total average weekday ridership (1982) is 20,320 persons.

No MBTA bus routes directly serve the project area. However, several MBTA buses, both local and express, and private commuter bus lines which serve cities and towns outside of the Metropolitan Boston area are available at Haymarket station, a short walk from the North Station area.

Table V-4 below shows the current daily loadings of the public transportation facilities serving the North Station area.

Table V-4

Average Daily Boardings - North Station Area

Orange Line (1978)	
North Station	4,186
Green Line (1978)	
Science Park	722
North Station (elevated)	1,659
North Station (surface)	2,059
Commuter Rail (1982)	10,314
TOTAL	18,940

Source: MBTA

3.3 Parking Facilities

Within the North Station project area there currently exist a total of 2,332 off-street parking spaces (see Table V-5 and Figure V-14).

Approximately 39% of these spaces, or 905 spaces, are open to the public, 375 spaces being located in a City of Boston-owned lot and the remainder in privately-owned lots. The remaining parking is primarily employee parking, principally for the Massachusetts Department of Public Works (552 spaces) and the Massachusetts General Hospital (800 spaces).

Table V-5

Parking Lots - North Station Urban Renewal Area

Sub-Area I

Lot Number	Capacity	Owner	Usage
16	51	J.I. Fitzgerald	Public
17-a	24	Cotting Company	Public
17-b	56	Cotting Company	Public
17-c	28	Cotting Company	Public
18	71	Sawyer System	Public
12	375	City of Boston, Real Property	Public
	605		

Sub-Area II

Lot Number	Capacity	Owner	Usage
14	50	Comm. of Mass. (DPW)	Employee
13	75	Comm. of Mass. (DPW)	Employee
9	400	Comm. of Mass. (DPW)	Employee
10	75	Mass. Rehab. Hospital	Employee
11	800	Mass. General Hospital	Employee
19	300	Lennel Company	Public
15	27	Comm. of Mass. (DPW)	Employee
	1,727		
TOTAL	2,332		

3.4 Pedestrian Circulation

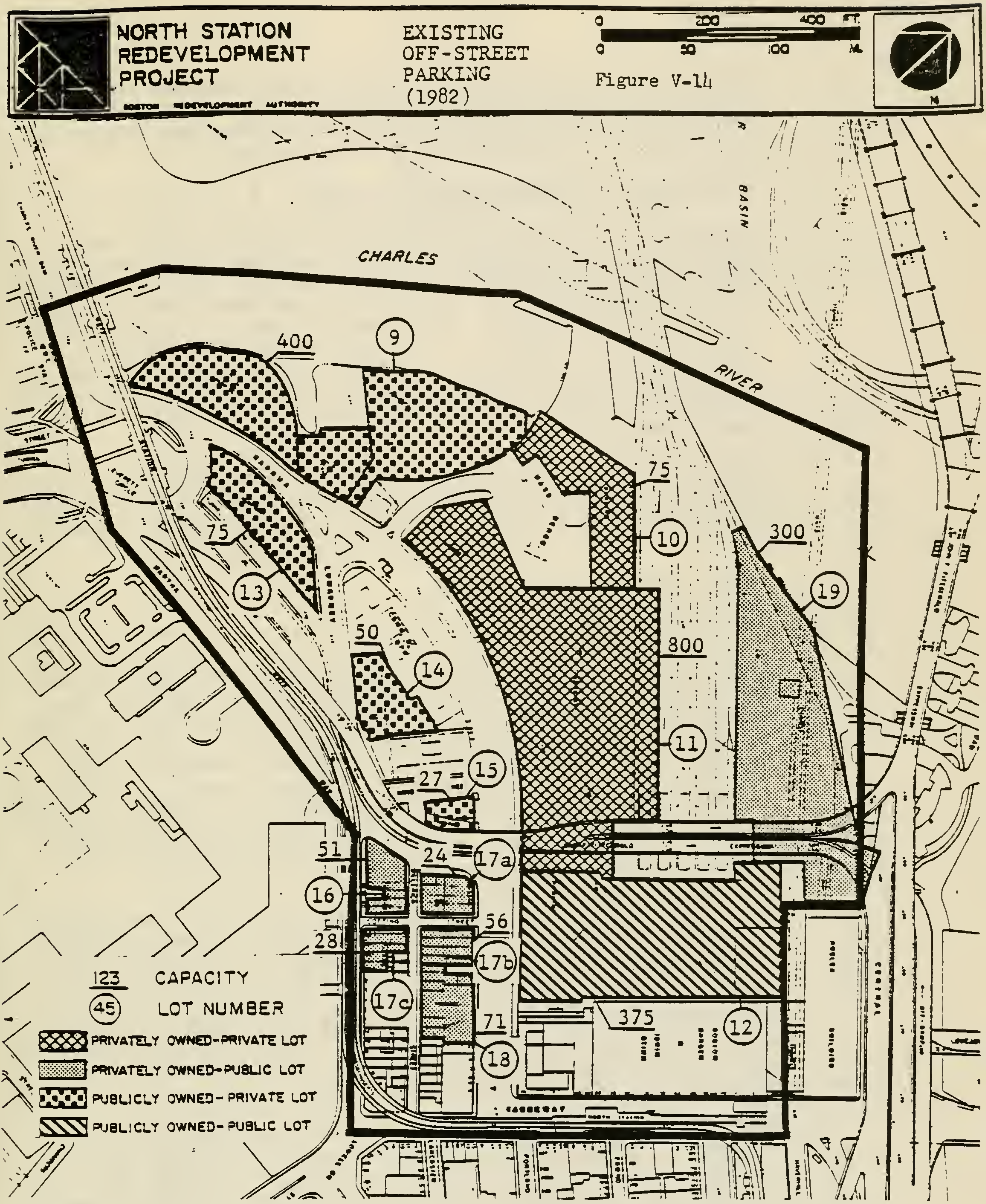
The major pedestrian approaches to the North Station area are via Staniford, Canal, and Causeway Streets. Along Canal Street, the principal link between North Station and Government Center/Downtown, the City recently has completed significant pedestrian improvements, including widened sidewalks, street trees, and other amenities. Within the project area, the only defined pedestrian circulation are the sidewalks along the area's streets and a public pedestrian way from the North Station concourse to the track area. In addition, a pedestrian foot-bridge crosses the Leverett Circle rotary and gives access to the Science Park MBTA station (there is also a direct access via stairs from Leverett Circle itself). Street crossing beneath the elevated tracks is particularly dangerous because of darkened conditions.

NORTH STATION REDEVELOPMENT PROJECT

BOSTON REDEVELOPMENT AUTHORITY

EXISTING OFF-STREET PARKING (1982)

Figure V-14



Major pedestrian activity occurs during the morning and evening rush hours, when commuters cross Causeway Street to and from downtown Boston and the area's commuter trains and parking lots, and during sporting and entertainment events at Boston Garden.

3.5 Commercial/Pleasure Boat River Usage

The Charles River Basin experiences both commercial and pleasure boat traffic passing through the dams travelling to and from Boston Inner Harbor. Between July 1, 1982 and June 30, 1983, 71 commercial vessels passed through the new Charles River locks in both upstream and downstream directions. The commercial boats consist primarily of tug boats, work barges, and fuel oil barges delivering fuel to Cambridge Electric Company. The larger barges are on the order of 200 feet in length. In winter, ice breakers also enter this section of the Basin, when necessary, to break the ice for passage of the fuel oil barges.

Pleasure craft passing in both directions through the locks during this same period totalled 23,811 boats. In this period, the locks of the new Dam were opened 8,270 times for passage of all types of craft.(1)

4. Public Services and Facilities

4.1 Public Services

Public services provided to the North Station project area include fire and police protection and residential trash collection. The City of Boston Fire Department is organized into two major divisions and 12 districts. The North Station project area is within Fire District 3. District Headquarters is located on Cambridge Street, approximately 0.25 miles distant, and includes Engine 4 and Ladder 24. Two other stations in this district are Engine 8 and Ladder 1 located on Hanover Street in the North End, and the Boston Fire Department Marine Unit located at Battery Wharf, both less than one-half mile from the project area.

The Police Department is subdivided into 5 districts. The project area is served by Boston Police Area "A" which includes the central area of Boston (Downtown, North End, Beacon Hill, the Waterfront, and South Cove), Charlestown, and East Boston. A total of 294 officers and men, whose duties include crime prevention, criminal apprehension, traffic control, and emergency assistance, serve the District. The District Headquarters is located on Sudbury Street and patrols of the district are made on a 24-hour basis by police cruisers, typically containing two officers.

Residential trash collection in the City is the responsibility of the Boston Public Works Department. In the North Station area, included in Public Works District 1-B, trash is collected three days per week under contract by Charles Lee Disposal, Inc., and is hauled to the RESCO recycling plant in Saugus. Commercial trash collection is the responsibility of individual commercial tenants who must contract privately for collection.

In terms of health facilities, the North Station area is adjacent to quality health care at the Massachusetts General Hospital. This large world-renowned facility provides adult and pediatric in-patient and out-patient medical and psychiatric care and numerous medical specialty services. The Shriners Burns Institute and Hospital for Children and the Eye and Ear Infirmary also are adjacent to the project area, and the Massachusetts Rehabilitation Hospital (a 284-bed private hospital for long-term care) is located within the project area. The nearest community health facility to the project area is the North End Community Health Center which receives emergency and back-up service from Massachusetts General Hospital.

4.2 Public Utilities

The North Station area is serviced by major public water and sewer lines operated by the Boston Water and Sewer Commission (Figure V-15). Water lines include a 10" - 12" diameter Low Service main in Nashua Street, 12" High Service and 16" Low Service mains in Causeway Street, 8"-16" diameter Low Service mains in Lomasney Way, an 8" diameter Low Service line in Billerica Street, a 10" diameter Low Service line in Minot Street, and a 16" diameter Low Service line in Martha Road. In addition, there is also a 16" diameter High Pressure Fire Service line in Causeway Street.

Fresh water for the project area is provided by the City of Boston's water distribution system, which is supplied by the MDC. The MDC system includes 32 communities and has a total pumping capacity of 450 million gallons per day. The principal source of water is the 18 mile long Quabbin Reservoir, located in Central Massachusetts. Due to the high quality of this water supply and strict enforcement of sanitary regulations in the watershed, it is unnecessary to maintain and operate extensive water treatment facilities.

The MDC also administers the Metropolitan Sewer District, which treats sanitary wastes from member communities. The system includes treatment plants at Deer Island and Nut Island in Boston Harbor, which use primary treatment methods (chlorination and sludge disposal). The original sewer and drain network in Boston was constructed as a combined system. This combined system causes a serious pollution condition in Boston Harbor during heavy flow periods when the sewers overflow, pouring raw sewerage into the Harbor. City, State, and Federal agencies currently are working on plans to alleviate these combined sewer overflows (CSO's) through expansion of the existing treatment facilities and through new separated sewer systems.

Combined sewer and storm drainage lines existing in the North Station area (Figure V-16) include two major drainage conduits under Nashua Street, one a 24" x 36" brick combined sewer from Causeway Street to Minot Street and the other a 72" x 90" Combined Sewer Overflow conduit from Causeway Street, which originally flowed to the Lowell Street outfall at the Charles River, northwest of Nashua Street. Early in 1981, flows from this outlet were intercepted by an 84" concrete extension of the MDC Boston Marginal Conduit passing under the Charles River and connecting to the MDC Charles River Estuary

NORTH STATION
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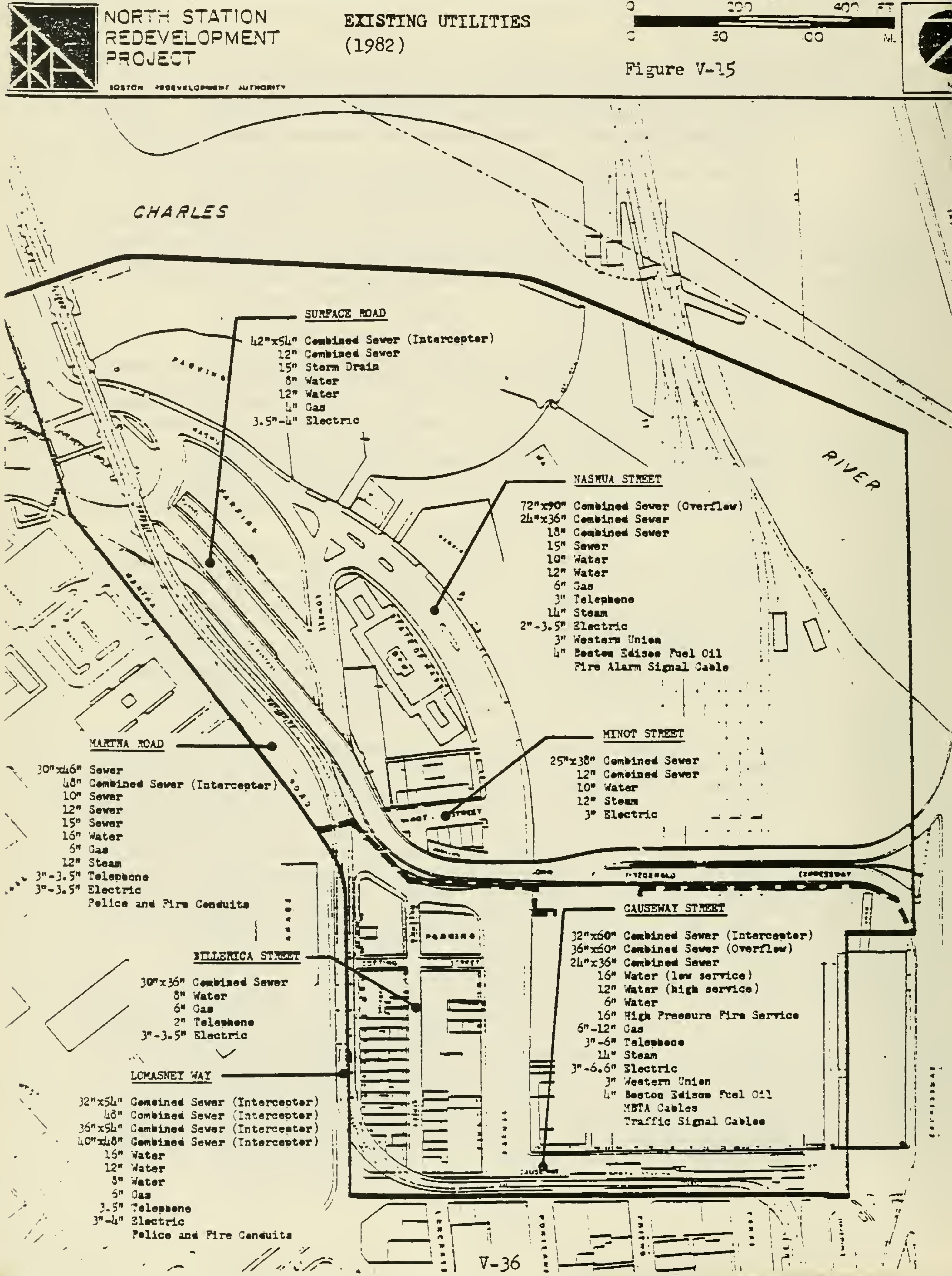
BOSTON REDEVELOPMENT AUTHORITY

EXISTING UTILITIES
(1982)

Figure V-15



SURFACE ROAD
42"x54" Combined Sewer (Interceptor)
12" Combined Sewer
15" Storm Drain
8" Water
12" Water
4" Gas
3.5"-4" Electric

NASHUA STREET
72"x90" Combined Sewer (Overflow)
24"x36" Combined Sewer
18" Combined Sewer
15" Sewer
10" Water
12" Water
6" Gas
3" Telephone
14" Steam
2"-3.5" Electric
3" Western Union
4" Boston Edison Fuel Oil
Fire Alarm Signal Cable

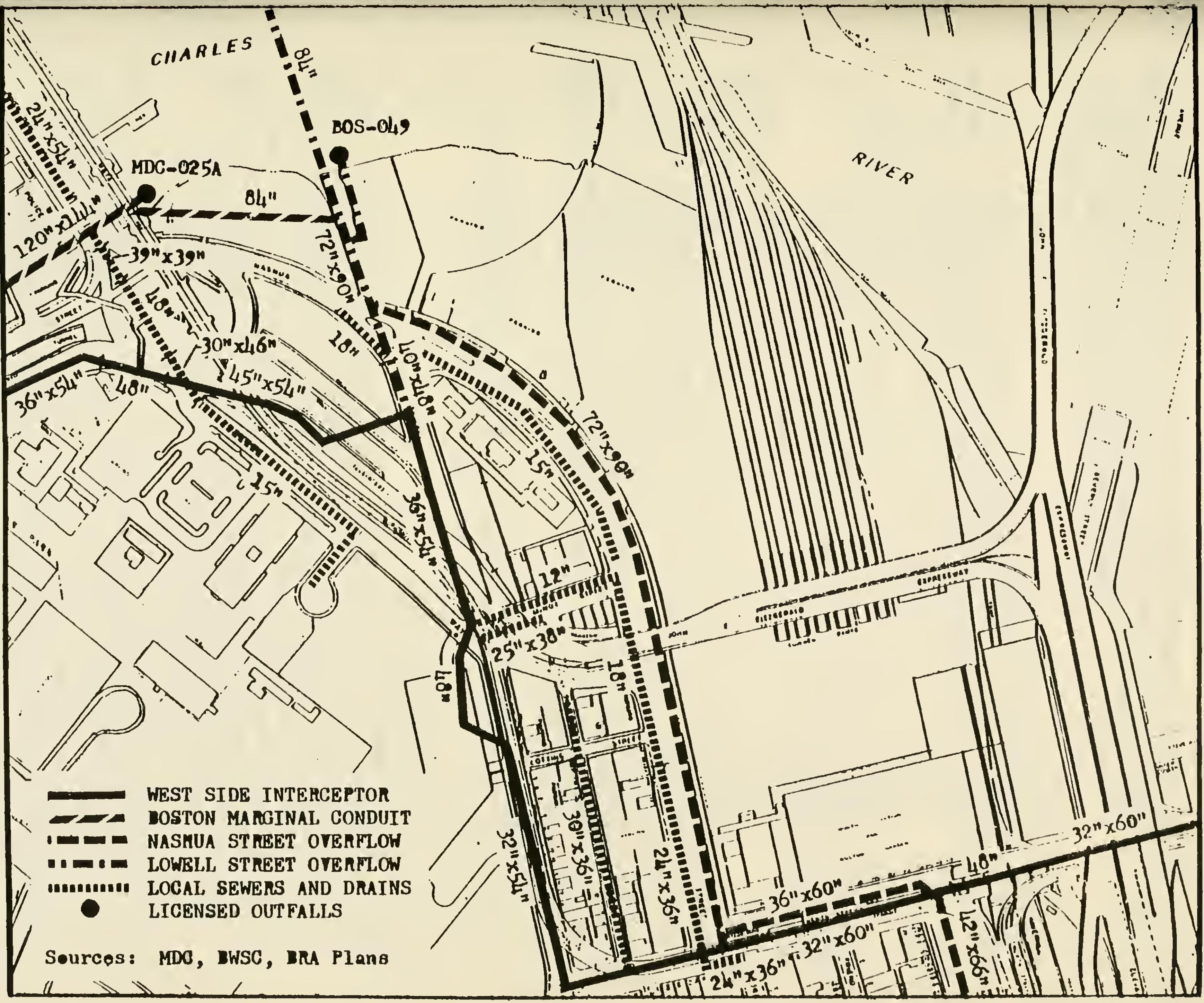
MARTHA ROAD
30"x46" Sewer
48" Combined Sewer (Interceptor)
10" Sewer
12" Sewer
15" Sewer
16" Water
6" Gas
12" Steam
3"-3.5" Telephone
3"-3.5" Electric
Police and Fire Conduits

MINOT STREET
25"x38" Combined Sewer
12" Combined Sewer
10" Water
12" Steam
3" Electric

BILLERICA STREET
30"x36" Combined Sewer
8" Water
6" Gas
2" Telephone
3"-3.5" Electric

CAUSEWAY STREET
32"x60" Combined Sewer (Interceptor)
36"x60" Combined Sewer (Overflow)
24"x36" Combined Sewer
16" Water (low service)
12" Water (high service)
6" Water
16" High Pressure Fire Service
6"-12" Gas
3"-6" Telephone
14" Steam
3"-6.6" Electric
3" Western Union
4" Boston Edison Fuel Oil
MBTA Cables
Traffic Signal Cables

LOMASNEY WAY
32"x54" Combined Sewer (Interceptor)
48" Combined Sewer (Interceptor)
36"x54" Combined Sewer (Interceptor)
40"x48" Combined Sewer (Interceptor)
16" Water
12" Water
8" Water
6" Gas
3.5" Telephone
3"-4" Electric
Police and Fire Conduits



Sources: MDC, BWSC, BRA Plans

Figure V-16: MAJOR COMBINED SEWER AND STORM DRAINS

Pollution Control Facility on the Cambridge shore for treatment and lifting to tide water at all stages of the tide. The old outfall has been replaced by a new 54" concrete outfall and weir structure. Activation of this conduit and pumping station, in January, 1981, provides a controlled low level discharge point for the Lowell Street overflow.

The West Side Interceptor, another important link in the drainage system for this area, is located under Causeway Street and Lomasney Way and flows generally southwesterly and southeasterly to connect with the Boston Main Interceptor in Huntington Avenue. This is variously a 32" x 60", or 32" x 54", or 36" x 54" conduit which connects to the Lowell Street overflow. Also located in Causeway Street is a 36" x 60" overflow connecting to the Lowell Street overflow and a 36" x 24" wood combined sewer which connects to the brick combined sewer in Nashua Street.

Also formerly discharging into the river, just below the old Charles River Dam, is the MDC Boston Marginal Conduit, a 120" by 144" reinforced concrete combined sewer which receives wet and dry weather flows from the Stony Brook Conduit and wet weather overflows from the combined sewers in the West End, Beacon Hill and Back Bay areas of Boston. This conduit is now connected with the Charles River Estuary Facility. However, since this facility is designed for a 1 year-6 hour storm, overflow outlets are still maintained for both the Boston Marginal Conduit and the Lowell Street Overflow for storm events exceeding the station's capacity, which are expected to occur once a year.

Two inverted siphon structures are located beneath the Leverett Circle underpass - one a twin 48" concrete structure built in 1931 and the other a 16" cast iron siphon.

4.3 Private Utilities

In addition to the public utilities, several private utility lines also are located in the area's streets (Figure V-15). These include 4"-12" gas lines, 3"-4" electric conduits, MBTA alternating current ducts, 8"-14" steam lines, 4"-6" Boston Edison fuel oil lines and telephone and Western Union conduits found variously in Causeway Street, Nashua Street, Lomasney Way, Martha Road, Minot Street, and the Surface Road. Crossing Leverett Circle from Martha Road to the old dam is the Boston-Cambridge "A" Cable, which carries vital government cables which must be maintained without interruption.

Natural gas is supplied to the project area by the Boston Gas Company. In 1980-81, Boston Gas sold 66,521 million cubic feet (MCF) of gas in its Boston division, which services an area within approximately 40 miles of Boston. Gas is supplied from three plants: the Everett Plant, the Commercial Point Plant in Dorchester, and the Wellesley Meter Station. During the summer months, the Algonquin Gas Transmission Company pipes natural gas into the Boston area from the Southwest. Boston Gas uses this partly to supply customers and partly to fill its storage tanks. During the winter months, Boston

Gas supplements its piped-in supply with stored gas. Boston Gas Company also supplements its gas supplies by shipping liquified natural gas from Algeria and by manufacturing synthetic natural gas from propane at the Everett Plant.

Electricity is provided to the project area by the Boston Edison Company's 115 kv transmission system. Major generating stations in the system include the new Boston Station in South Boston, Mystic Station in Everett, and Pilgrim Nuclear Station in Plymouth. Boston Edison is also a member of the New England Regional Electrical Generating and Transmission Pool, which increases reliability of service by interconnecting many systems.

In 1980, the peak summer demand on the Boston Edison system was 2,100 megawatts (Mw). The winter peak demand, on December 19, 1979, was 1,813 Mw. By 1990, the peak summer demand is projected to reach approximately 2,490 Mw, and the peak winter demand, 2,174 Mw. The present peak net capacity of the Boston Edison system is 2,801.5 Mw of electricity.

For 1990, Boston Edison projects its peak net capacity (winter) to be 2,381.69 Mw, which includes the addition to the system of a 10 Mw methanol demonstration facility scheduled to come on-line in 1987 and 41.4 Mw of purchased power. Until recently, Edison also had proposed to build a second nuclear power plant at Plymouth (Pilgrim II), with a capacity of 1,150 Mw. However, due primarily to the rapidly increasing costs of construction, Boston Edison since has decided to cancel this plant. Without Pilgrim II, Edison's projected 1990 winter peak net capacity still would be 207.69 Mw greater than its projected peak demand; however, peak summer capacity would fall approximately 186.5 Mw short of its projected summer peak demand. Edison presently is studying options to purchase shares of future new facilities which could overcome this deficit.

Boston Edison also owns and operates a district heating system which provides steam, primarily for heating and air conditioning, to the downtown Boston area. Four plants are tied with the system. Baseload supply is provided by the Kneeland Street steam plant near South Station, which has a sendout capacity of 1.1 million lbs./hr. Additional or peaking capacity for the system is provided by the Minot Street steam plant, in the North Station project area, and by the Scotia Street plant in the Back Bay. The fourth plant, the L Street plant in South Boston, currently is off-line due to a shrinkage in demand in recent years. The three operating plants have a total sendout capacity of 1,830,000 lbs./hr. Peak winter demand of about 1,520,000 lbs./hr., occurs typically in the late morning of the coldest day while peak summer demand of about 1,225,000 lbs./hr. occurs in the mid-afternoon of the hottest day.

The Minot Street plant, although normally operated only about 10 days a year, during the winter peak loading period, is nevertheless vital to the maintenance of adequate steam pressure in the area, and particularly to the Massachusetts General Hospital complex, which is Edison's largest customer. This plant has two oil-fired boilers burning #6 oil (0.5% sulfur content) with a sendout capacity of 300,000 lbs./hr., supplying approximately 3% of the system's annual need. Fuel oil is delivered to the Minot Street plant via an underground pipeline from Edison's New Boston electric generating station in South Boston. To the rear of the plant is a 30-foot addition (currently unused) which was originally a brine/ice plant for Boston Garden.

5. Economic Activity

The North Station project area currently contains 31 businesses, an office building, hospital, and utility plant employing a total of approximately 1,959 persons. The largest employers are the Massachusetts Department of Public Works and the Registry of Motor Vehicles, which together employ an estimated 900 persons at the Registry Building on Nashua Street, and the Massachusetts Rehabilitation Hospital, with 780 employees. Smaller offices employ some 21 persons. There are 21 retail and commercial firms employing 135 persons and occupying a total area of 41,430 sq.ft.; these are located in the Billerica Street blocks and in the North Station/Boston Garden building. Principal businesses include restaurant/lounge, sports/souveniers, and antiques/used furniture. In addition, the area contains 5 privately-owned commercial parking lots and one City-owned public lot.

A third major employee is the Boston Bruins/Boston Garden Corporation, which has a staff of 100 persons who operate and maintain the Garden. Another 14 persons are employed at the MBTA commuter rail terminal. The Edison steam plant is normally manned only during the winter peak loading period, with one person for each of two daily shifts.

The project area also contains the 500-room Madison (formerly Manger) Hotel, which has been vacant since 1976.

C. Natural Physical Characteristics

1. Geology and Topography

1.1 Geological and Subsoil Conditions

The North Station area originally was part of the Charles River Estuary, the present alignment of Causeway Street generally being a long, narrow island of solid ground separating the river from a large, marshy cove to the south. This cove was converted into a mill pond in the mid-1640's and was subsequently filled between 1807 and 1822. The area north of Causeway Street and east of Lomasney Way began to be gradually filled soon thereafter, a process which continued into the 1930's.

A review of readily available subsurface information (1) indicates the vertical soil and rock sequence to be fill material underlain by organic soils and river and sea deposits before glacial till and bedrock are reached (Figures V-17 - V-19). While this sequence reflects the general mode of deposition, one or more soil units may be absent at specific locations. Details of the soil profile follow.

Fill Deposits: The fill material, consisting mainly of loose to dense miscellaneous materials such as brick, cinder, wood chunks, gravel, and excavation debris, with some sands and mixed clays, extends generally to a depth of between 5 and 39 feet.

Organic Deposits: The organic deposits, representing the original tidal marsh, range from very soft to soft fibrous peat to fine sandy organic silt. In general, the organic deposits are thicker and more variable in the areas to the east of Lomasney Way, where the thickness varies widely from 5 feet in deep fill areas to as much as 25 feet in the vicinity of North Station. The peat is a discontinuous, thin (less than 5 feet thick) layer underlying the organic silt, noted in some borings below North Station and in the vicinity of Leverett Circle. Generally, the organic deposits are compressible.

Marine Deposits: The marine deposits consist of complex strata of sand and clay, varible both in consistency and in thickness from 5 to 50 feet. These deposits are composed mainly of fine- to coarse-grained sand, gravel, and fine to medium stiff to very stiff silty yellow and blue clays, with shells and boulders occasionally mixed in. Medium to stiff yellow and blue clays (Boston Blue Clay) generally begin at depths of 20-50 feet below ground surface but become softer and mixed with sand and gravel with depth.

Glacial Till: The glacial till deposits, ranging from very compact gravelly coarse to fine sand to hard fine sandy silt, vary in thickness, generally between 5 to 20 feet. A thick (40-45 feet) heterogeneous deposit of sand, silt, gravel, and clay (probably glacial till) was encountered beneath the fill in the vicinity of Leverett Circle. The till generally is found within 50 feet below grade from the top of the filled area and within 15-30 feet below the river bottom.

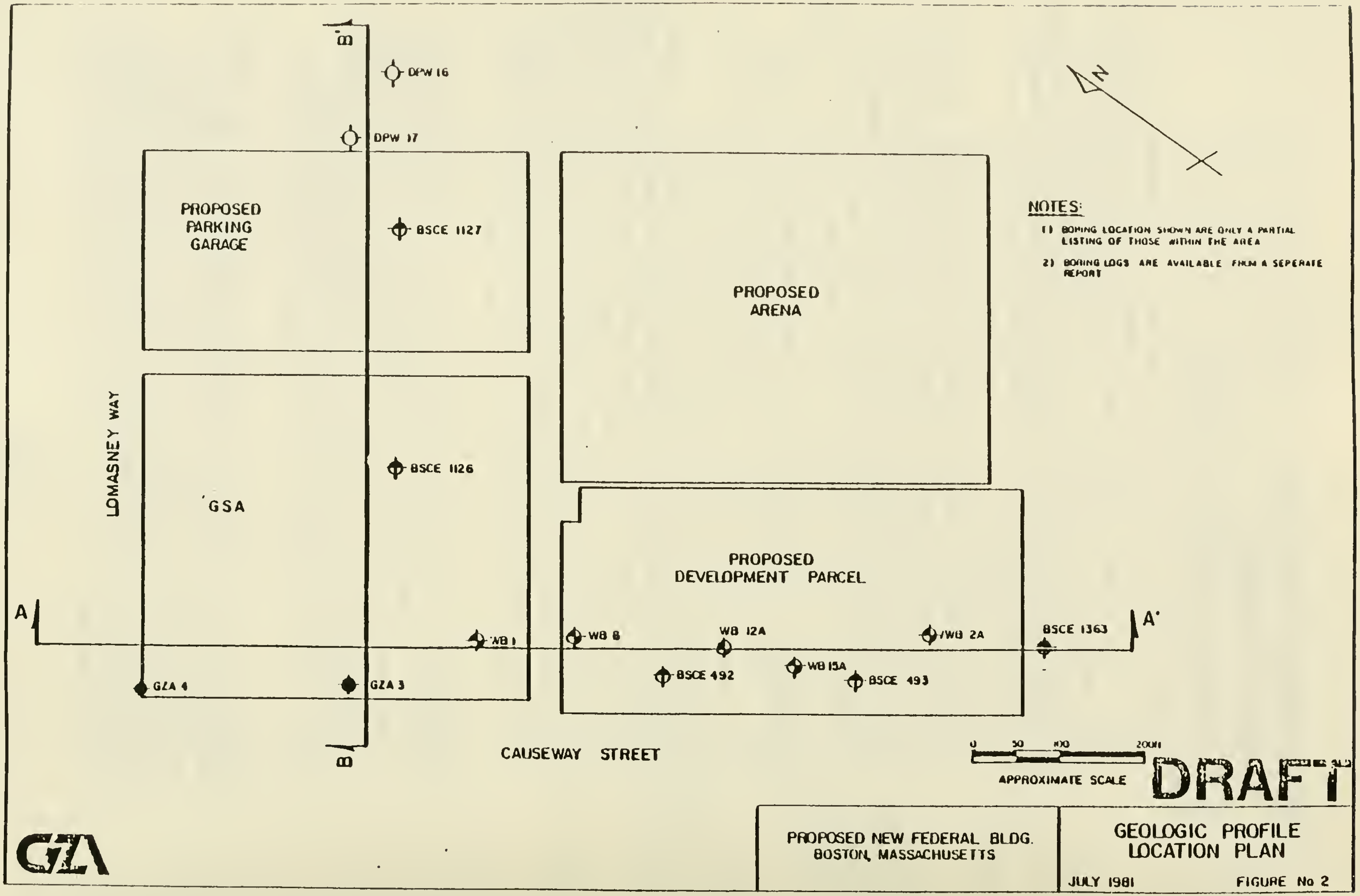


Figure V-17: North Station Project Area (Sub-Area I) - Geologic Profile: Location Plan

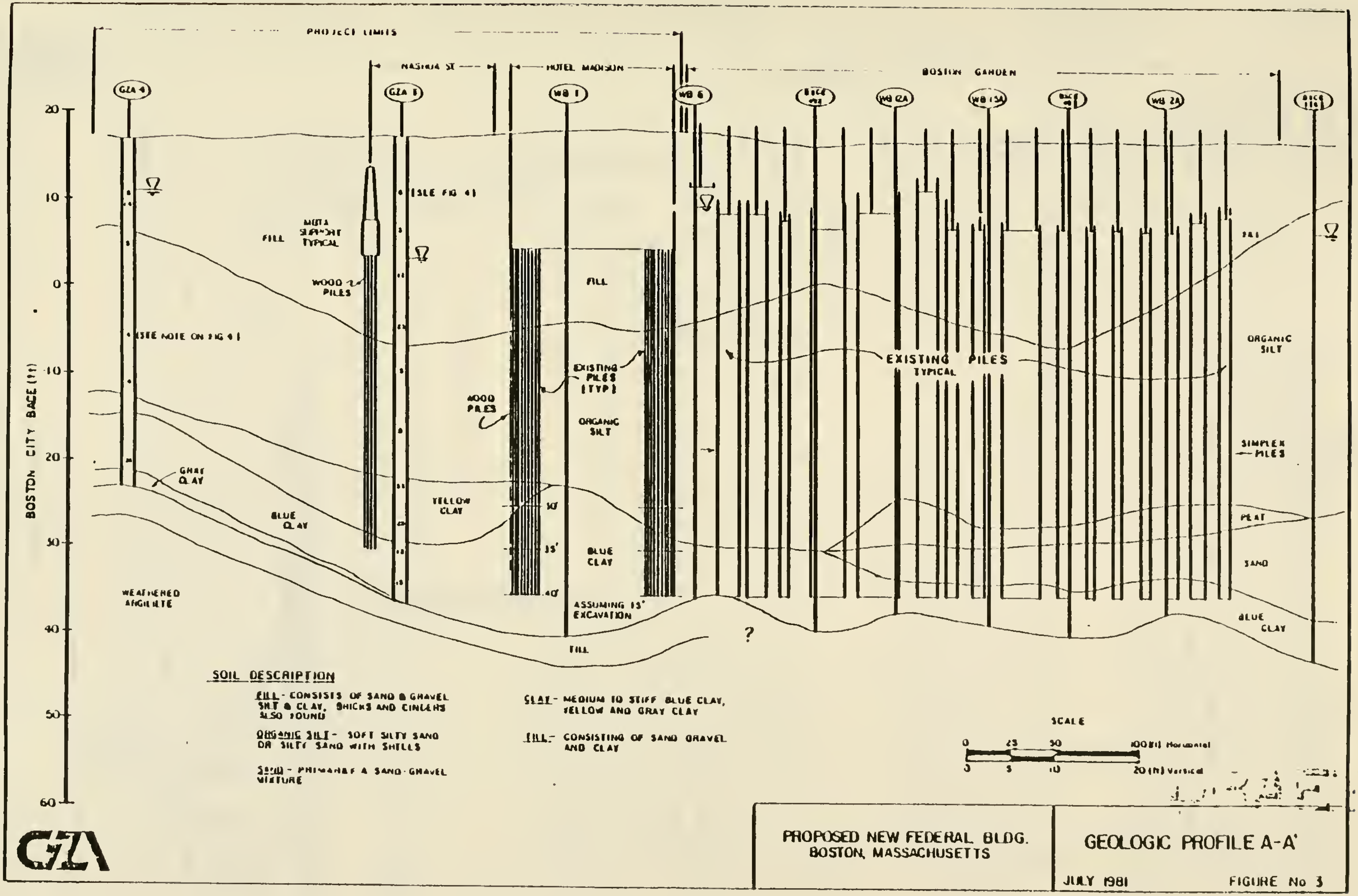


Figure V-18: North Station Project Area (Sub-Area I) - Geologic Profile A-A

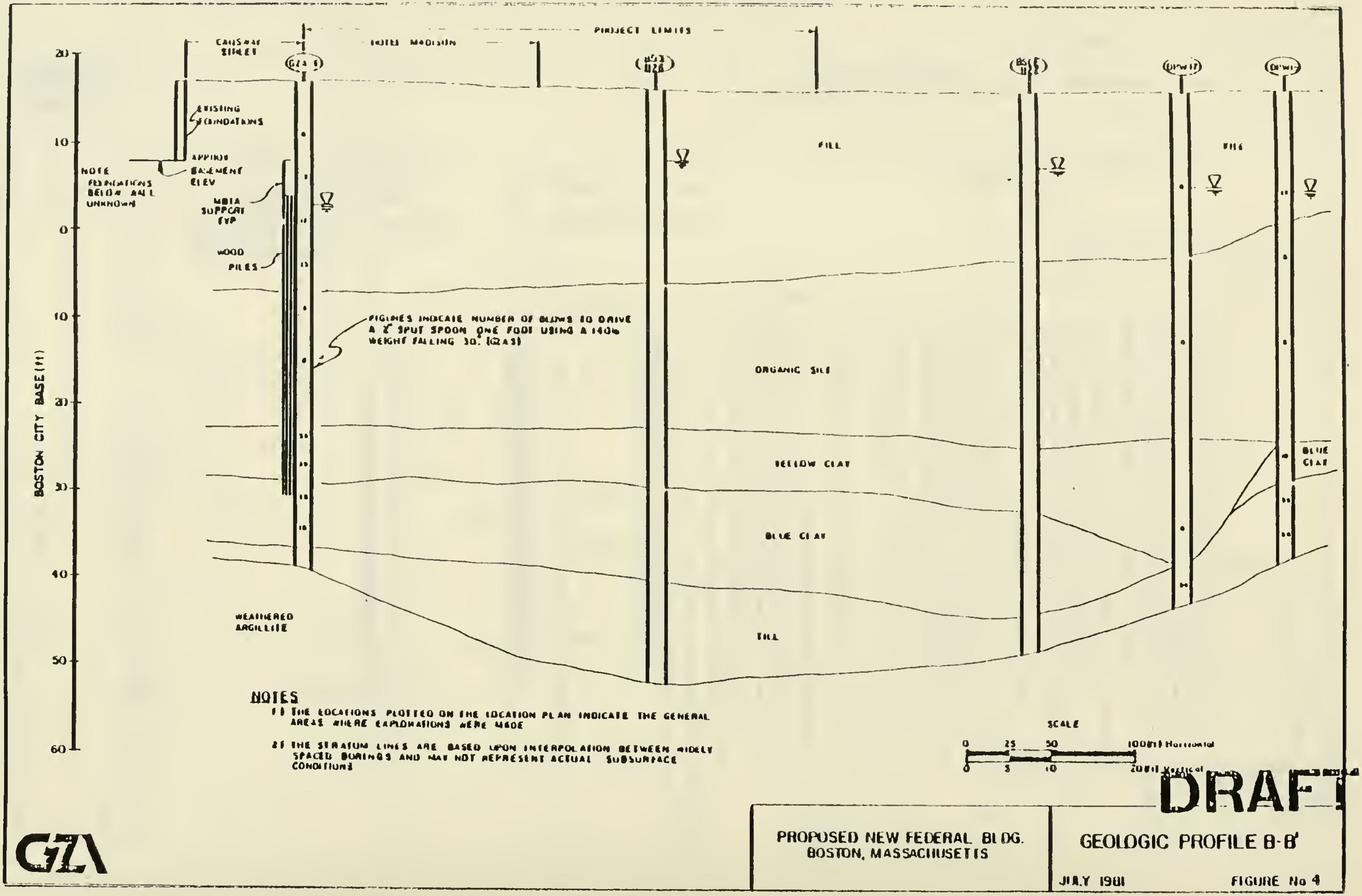

BOSTON CITY BASE (ft)
20
10
0
10
20
30
40
50
60
CAUSEWAY STREET
HOTEL MADISON
PROJECT LIMITS
DPW 17
EXISTING FOUNDATIONS
APPROX BASEMENT ELEV
NOTE FOUNDATIONS BELOW ARE UNKNOWN
MBTA SUPPORT TYP
WOOD PILES
FIGURES INDICATE NUMBER OF BLOWS TO DRIVE A 2" SPLIT SPOON ONE FOOT USING A 140lb WEIGHT FALLING 30" (Q.A.S)
FILL
ORGANIC SILT
YELLOW CLAY
BLUE CLAY
TILL
WEATHERED ARGILLITE
NOTES
1) THE LOCATIONS PLOTTED ON THE LOCATION PLAN INDICATE THE GENERAL AREAS WHERE EXPLORATIONS WERE MADE
2) THE STRATUM LINES ARE BASED UPON INTERPOLATION BETWEEN WIDELY SPACED BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS
SCALE
0 25 50 100(ft) Horizontal
0 5 10 20(ft) Vertical
DRAFT
GZA
PROPOSED NEW FEDERAL BLDG.
BOSTON, MASSACHUSETTS
GEOLOGIC PROFILE B-B'
JULY 1981
FIGURE No 4
FILE No G-2800

Figure V=19: North Station Project Area (Sub-Area I) - Geologic Profile B-B

Bedrock: The bedrock is an extremely irregular surface of Cambridge Argillite, with the top of the rock at elevations ranging from -10 to -55 (Boston City Base Datum). The bedrock appears to be deepest (elevation -45 and -55) in the vicinity of North Station. Relatively shallow bedrock occurs along Lomasney Way, where the rock lies at approximately elevation -20, and near the rail yards adjacent to the river. In addition, the upper surface of the argillite was found in some borings to be kaolinized, i.e., weathered to a clay-like consistency. Shale and slate deposits also were encountered above the bedrock.

1.2 Topographic Conditions

The topography of the project area is virtually flat, reflecting the fact that most of the North Station area lies on fill. Elevations (BCB) range from a low of 14 feet (Nashua and Causeway Streets) to a high of 19 feet in the Leverett Circle area; most elevations are between 16 and 18 feet. Charles River depth varies generally between 12 feet and 24 feet in the channel area.

1.3 Water Table

The water table in the area is high, reflecting the relatively low permeability of the soil and recharge from the Charles River basin. Depth to groundwater varies generally from five feet to twelve feet and is tidal near the river. Maximum water table levels range between one foot and six feet (sea level datum of 1929) and minimum levels range from zero to three feet.(2)

Continued operation of the new Charles River Dam is expected to stabilize somewhat the groundwater elevation at approximately Elevation +8 (BCB), the level of the river, or about 6-11 feet below grade. However, normal fluctuations in the groundwater table should be expected, due to factors such as rainfall, temperature, and season.

1.4 Natural Features and Hazards

Since the project area and immediate environs are essentially man-made environments and have been built-up since the 19th century, there exist no valuable, unique, or fragile natural resources (with the exception of the Charles River, described previously).

The project area is located in a relatively stable geologic zone and is only moderately susceptible to a natural disaster caused by faulting or eruption of the earth's crust. Nevertheless, according to the "Seismic Risk Map of the United States", the U.S. Geological Survey has placed Boston in earthquake Zone 3, the highest possible rating (ratings are based on known geologic formations, evidence of strain release, and historical records of known earthquakes). The major reason for Boston's high risk rating is a 1755 earthquake off the coast of Cape Ann, which reportedly measured an intensity rating of VIII on the Modified Mercalbi Intensity Scale. No earthquakes of this magnitude have occurred since then, and there is some speculation that the records of the 1755 earthquake are somewhat exaggerated. Moreover, historical records indicate that the probability of a damaging earthquake occurring in Boston is about 30 times less than for San Francisco, which is in the same seismic risk zone. However, since the project area consists basically of fill material resting on unconsolidated organic and marine deposits, and groundwater levels are high, the potential for failure should an earthquake occur would be high. Potential hazards include ground shaking, liquidfication of unconsolidated materials with resultant lateral landsliding and bearing capacity failure, and subsidence.

2. Hydrology and Flooding

2.1 Hydrology

The Charles River is an approximately 80-mile long stream meandering from its source in Hopkinton, Massachusetts, to its mouth at Boston Inner Harbor. In terms of hydrology, the river can be divided into three portions. The upper valley headwaters, characterized by a high gradient, begins at Hopkinton and flows southerly and northeasterly to Medfield. The middle reach begins after Medfield where the river gradient flattens out until it reaches Wellesley. From Wellesley to the Watertown Dam the Charles is again characterized by a steeper gradient. The third portion of the river, known as the Lower Charles River Basin, runs from the Watertown Dam to the new Charles River Dam at Warren Avenue in Charlestown.

Primarily as a response to extensive flood damage along the Charles River since 1955, the Army Corps of Engineers was authorized by Congress in 1965 to study the basin and its tributaries to determine what improvements would be advisable not only for flood control but also for water supply, water quality, recreation, navigation, and other purposes related to land resources. One of the primary recommendations resulting from this study was the construction of a new dam downstream of the Leverett Circle dam. Construction of this new Charles River Dam was completed in 1978. However, due to existing combined sewer overflows in the Basin, the new dam was not put into operation until late 1980, when the new Charles River Estuary Pollution Control Facility on the Cambridge shore was completed. The old dam was then deactivated and the basin extended to the new dam. With the opening of the new Charles River Dam, the hydrological conditions of the Charles River bordering North Station have improved over the former tidal conditions.

2.2 Flooding

The land portion of the project area along the Charles River is located within a Zone C (area of minimal flooding) as defined by the National Flood Insurance Program of the Federal Emergency Management Agency (see Figure V-20). The 100-year flood level for the Charles

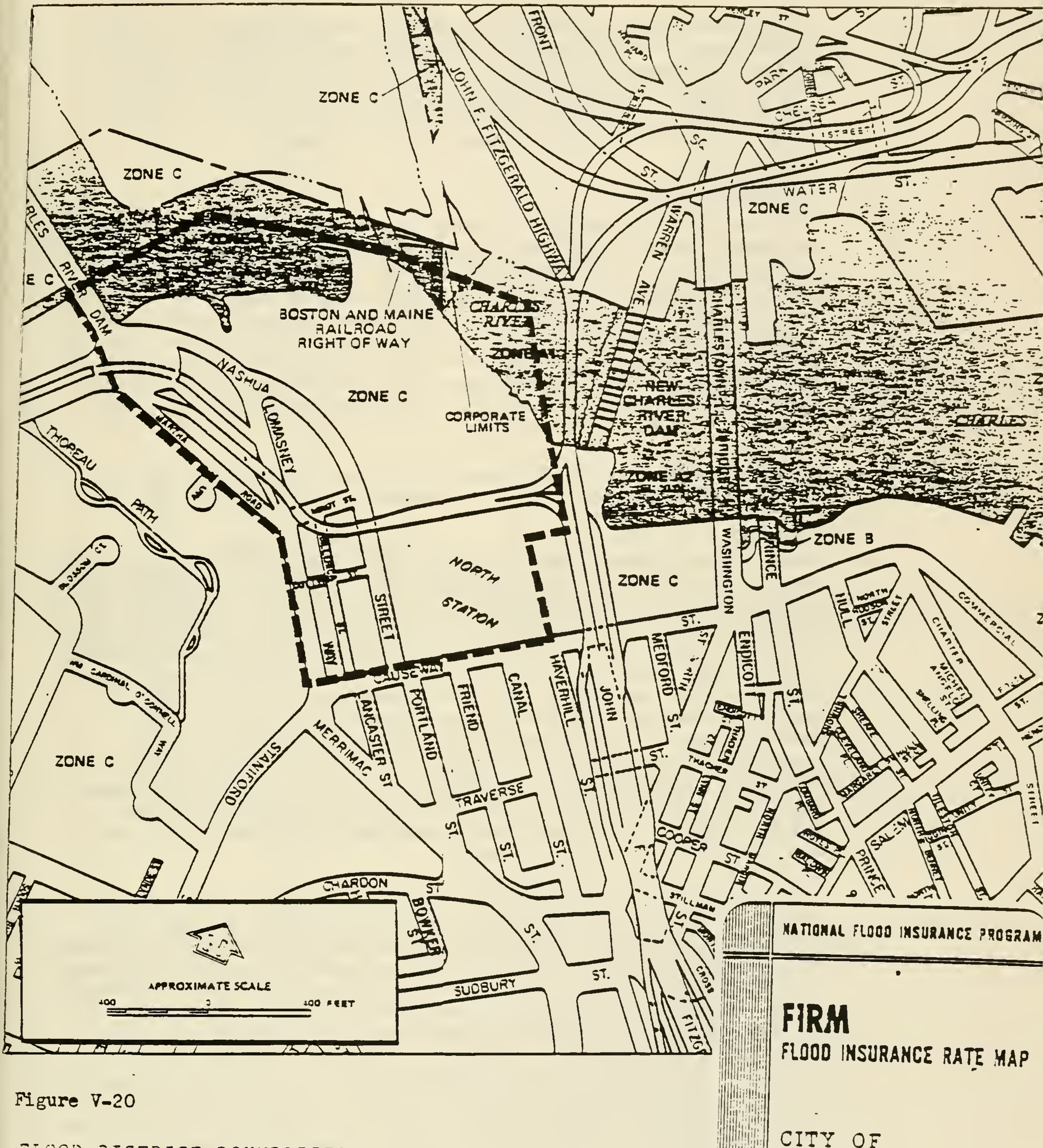


Figure V-20

FLOOD DISTRICT BOUNDARIES

River Basin south of the old dam was 12.55 feet (BCB) (4.5 feet above normal level), based on the hurricane of August, 1955. The new dam has been designed for a standard project flood (SPF) which is 50% greater than the storm of 1955 and will control flooding in the Basin up to the Watertown Dam through the operation of six diesel pumps having a total capacity of 8,400 cfs.

3. Water Quality

The Charles River Basin, including the Charles River Estuary Sub-area, has been classified by the Division of Water Pollution Control, in accordance with the "Massachusetts Water Quality Standards," as a Class C inland water. In general, these waters should be suitable for recreational boating and secondary water contact recreation, as a habitat for wildlife and fish indigenenous to the region, and for certain agricultural and industrial uses; have good aesthetic value; and under certain conditions be acceptable for public water supply with treatment and disinfection. The criteria for specific water quality parameters are indicated in Appendix D.

Data from water quality measurements collected by the MDC in 1982 near the MBTA bascule bridge are presented in Table V-6. (1)

These data indicate that this part of the Basin appears to be meeting Class C water quality criteria - the water had a light amber color, low turbidity, and acceptable levels of pH, dissolved oxygen, BOD, and fecal coliform bacteria. Total phosphorus concentrations, however, were more characteristic of nutrient-rich conditions. Stratified testing also indicated a clinograde oxygen curve (concentrations decreasing with depth) where at a depth of 25 feet dissolved oxygen in July was below the 5.0 mg/l minimum for Class C water. Coliform levels appear to have been reduced considerably from previous years, as a result of the elimination of most of the combined sewer overflows; the current counts can be attributed mainly to existing urban runoff into the river. Limited 1982 data indicated total coliform levels of between 2,300 and 4,900 per 100 ml, and fecal coliform levels from 190 to 700 per 100 ml, which are within Class C water standards.

Due to recent water quality improvements completed by the MDC, the Charles River Basin has become a much cleaner Class C water body. In the past, the Basin violated Class C water quality standards due to: 1) combined sewer overflows and stormwater run-off and drainage into the Basin; and 2) density stratification of the basin from salt water intrusion. Prior to the operation of the Charles River Estuary Facility (Prison Point Pump Station) the Basin received a total of 26 combined sewer and storm overflows, including two outfalls - the Lowell Street overflow above the extension of Lomasney Way and the Boston Marginal Conduit Outfall at Leverett Circle - which discharged into the Charles within the project area. With the completion of the Prison Point Station, six major CSO discharge points on both sides of the Charles River downstream of the Boston University Bridge (excepting the Back Bay Fens overflows) have been tied into the pumping station, thus significantly reducing discharges into the river (outfalls are still maintained, however, for storm events exceeding the design capacity of the station).

Table V-6

CHARLES RIVER WATER QUALITY
(1982)

Date/ Station	Temperature (°C)	Color (Units)	Turbidity (NTU)	Specific Conduct. (μmhos/cm)	Salinity (ppt)	pH	DO (mg/l)	BOD (mg/l)	Cl (mg/l)	Total P (mg/l)	Total Col /100 ml	Fec Col /100 ml
4/2/82 Surface	5	30	1.5	350	0	7.2	11.8	1.9	150	0.05	2300	280
5/20/82 Surface	16			700	0	7.7		8.5				
10 ft	16			700	0	7.7		8.4				
20 ft	15			2500	1	7.6		8.0				
6/4/82 Surface	14	25	1.0	600	<1	6.9	8.0	1.8	450	0.04	4900	700
7/21/82 Surface	22			1300	1	7.0	5.3					
15 ft	22			1500	1	6.9	5.2					
25 ft	22			1800	1	6.9	4.7					
8/31/82 Surface	15	20	1.5	700	<1	7.6	9.6	1.9	920	0.05	--	190
10/29/82 Surface	13			410	0		9.3					
15 ft	13			500	0		8.5					
25 ft	14			650	<1		6.5					

At the same time, urban stormwater runoff from streets and sidewalks, parking lots, and other paved surfaces continues to be a major pollution source and can cause high nutrient and coliform levels and increases in biological oxygen demand. Urban stormwater contains substantial amounts of pollutants, including debris and dust from streets and open spaces, publicly-used chemicals, air-deposited substances, ice-control salts, fecal contaminations from dogs, and dust and contaminants worked off or emitted from vehicles. Typical concentrations of various pollutants from storm runoff water, which often may be considerably higher than raw sewerage, are indicated on Table V-7).

The saltwater intrusion resulted primarily from lock operations of the old Charles River Dam (one large - 350' x 45' - lock accommodated all vessels and admitted the same amount of salt water into the Basin for a large commercial ship as for a small pleasure boat). Additional salt water leaked in through the sluices at the Dam or overflowed through faulty tide gates in Boston Harbor.

This intrusion caused a stagnant dense lower layer of water along the Basin which in turn caused anaerobic conditions and inhibited vertical mixing. Because salt water has a greater density than fresh water, it remained on the bottom as a stratified layer filling the deeper portions of the Basin. As organic matter settled to the bottom, its high oxygen demand caused the depletion of free oxygen in this bottom layer. Also, the density differences between the two layers prevented an exchange of water and therefore of oxygen. The decomposition of organic matter in water devoid of oxygen caused the generation of hydrogen sulfide, a toxic, offensive gas described as having a "rotten egg" smell. Fish and the organisms which they feed upon could not survive in such an environment.

This situation has been corrected to a large degree by destratifying or mixing the bottom salt water with the upper fresh water under a recently-initiated destratification project. In 1978 and 1979, five air diffusers were installed at several locations in the Basin (including one just below the old dam, within the project area) to assist in the destratification and to improve anoxic conditions at the sites. The function of the diffusers is to eliminate the conditions causing the generation of high concentrations of hydrogen sulfide in the bottom waters and to oxygenate the stagnant salt water layer to create a totally oxygenated water column. Monitoring has indicated that the air-mixing has eliminated the extensive stratified anoxic bottom water and that water quality has improved primarily because the formerly-high concentrations of sulfides, nutrients, and oxygen-consuming materials in the anoxic zone have disappeared. Oxygen now is found throughout the water column, in sufficient quantity to support aquatic organisms. The air mixing has helped to flush the salt water from the Basin, although a salinity gradient still exists (see Table V-6). Moreover, this project has reduced the production of hydrogen sulfide, making the bottom of the Basin inhabitable for fish. Monitoring also has shown that air-mixing did not resuspend the polluted bottom sediments.

Table V-7

Pollutant Loadings from Urban Runoff

Pollutant Parameter	Loading Rate[1] (lb./curb mile/day)
Total Solids	730
Volatile Solids	51
BOD_5	4.5
COD	26
Kjeldahl Nitrogen	0.66
Nitrates	0.029
Phosphates	0.37
Total Heavy Metals	1.3
Total Pesticides	200
	(10^9 org./curb mile)
Total Coliform	99
Fecal Coliform	5.6

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[1] Average rate of accumulation, from Sartor, James D. and Boyd, Gail B., Water Pollution Aspects of Street Surface Contaminants (EPA-R2-72-081), Washington, D.C., November 1972.

In addition, with improved lock operations at the new dam, the MDC expects salt water intrusion to be cut by 80%. The new dam also is designed with a low salt water drain, holding the intrusion of salt for release at normal drainage. Furthermore, lock pumping operations pump higher than Basin elevations of salt water back into the Harbor. (2)

The bottom sediments of the Charles River Basin have been described as black, soupy muds characterized by a high organic content (approximately 25%), high levels of oil and grease (1,000 to 9,000 mg/kg dry weight), and (prior to the Destratification Project) a pungent sulfur odor attributable to the anoxic salt water bottom layer. Polychlorinated biphenels (PCB) and polycyclic aromatic hydrocarbons have been identified in the sediment and are thought to be a product of combustion of hydrocarbons that enter the basin via stormwater runoff. Heavy metals in high concentrations also have been found in the bottom sediments, as indicated in Table V-8.(3)

The high concentrations of heavy metals are attributable to the area's urban runoff. Sampling for heavy metals was conducted at the BU and Harvard Bridges from 1976 to 1979, as indicated in Table V-9. These measurements showed that during the 1978 dry weather survey only lead appeared to exceed the applicable criteria for protection of freshwater aquatic life. However, the 1979 wet weather survey indicated that copper, lead, zinc, and cadmium surface water concentrations exceeded applicable standards. Although continuous exposure of aquatic life in the Basin to high concentrations of lead may represent an adverse long-term impact, the lead measurements do not distinguish among the various organic and inorganic forms of lead. Therefore, the bio-availability of lead to the aquatic biota is not known.(3)

Immediately north of the project area, the Boston Sand and Gravel Company is permitted to discharge concrete slurry washwater into the Millers River, a tributary of the Charles River. The company's NPDES permit establishes an effluent limit for total suspended solids (20 mg/l), sulfates (250 mg/l), and turbidity (25 JTU) and requires the Boston Sand and Gravel to investigate the feasibility of eliminating the discharge. Also discharging into the Millers River are cooling water and surface runoff from the Boston & Maine Railroad/MBTA yards in Cambridge. The NPDES permit for this discharge limits oil and grease to a daily maximum of 15 mg/l. Average operating flow is 100,000 gallons per day.

Water quality in the Charles River Basin is expected to improve progressively as a result of ongoing MDC activities in the Basin and the continued operation of the new Charles River Estuary Pollution Control Facility and new Charles River Dam. The new dam and pollution control facility are significantly aiding in the reclamation of the Basin and restoration of a healthy aquatic ecosystem, by greatly reducing the volume of saltwater entering the Basin from the Boston Harbor through the locks and by eliminating most of the combined sewer overflow discharges. The goal of these pollution abatement efforts is to improve water quality so that it will be a

TABLE V-8

HEAVY METAL CONCENTRATIONS IN SEDIMENTS IN CHARLES RIVER BASIN

Parameter	Concentrations as mg/kg dry weight Below Harvard Bridge	Below Longfellow Bridge
Iron	41,000	37,000
Manganese	330	260
Lead	1,500	1,200
Zinc	970	1,100
Nickel	150	160
Cadmium	43	46
Chromium	360	390
Arsenic	< 0.3	< 0.3
Copper	760	750
Silver	17	13
Mercury	2.4	3.7

Source: An Evaluation of the Removal of Salt Water from the Charles River Basin, Commonwealth of Massachusetts, Metropolitan District Commission, by Camp, Dresser and McKee, 1976, as referenced in Metcalf and Eddy, Inc., Combined Sewer Overflow, Charles River Basin Facilities Planning Area, Volume II - Environmental Assessment Report, Boston, June 13, 1980, prepared for Metropolitan District Commission, P. 3-17.

TABLE V-9

CONCENTRATIONS OF HEAVY METALS IN WATERS OF CHARLES RIVER BASIN

	Concentration mg/l At BU Bridge Dry Weather(1)	Wet Weather(2)	Below Harvard Bridge(3)	Applicable criterion for the protection of freshwater aquatic life(4)
Copper	0.04	0.11	0.01-0.32	0.08
Chromium	0.02	0.06	0	0.10
Lead	0.05	0.09	0.03-0.15	0.02
Zinc	0.01	0.40	0.09-0.18	0.078
Mercury	-	-	0-.0073	0.00005
Cadmium	-	0.03	0-0.04	0.004 (soft water) 0.012 (hard water)

(1) Metcalf & Eddy, Inc., November 1978. Field Survey. Average of three dry days.

(2) Metcalf & Eddy, Inc., April, 1979. Field Survey. Average of three wet days.

(3) Camp, Dresser & McKee, Inc., An Evaluation of the Removal of Salt Water from the Charles River Basin, Commonwealth of Massachusetts, Metropolitan District Commission, 1976. These values are ranges based on several depths (0-25 feet) at several stations below Harvard Bridge.

(4) U.S. EPA, Quality Criteria for Water, 1976.

Source: Metcalf & Eddy, Inc., Combined Sewer Overflow Charles River Basin Facilities Planning Area, Volume II - Environmental Assessment Report, Boston, June 13, 1980, prepared for the Metropolitan District Commission, p. 3-15.

clean Class "C" water. This will be done primarily by reducing the quantities of solids and bacteria entering the Basin by storage of the combined wastewater until the sewer capacity can handle the flow or by treatment before discharge. However, the Basin will not attain Class "B" or swimming quality as a result of these or other on-going pollution control efforts because of the poor quality of urban stormwater which will continue to flow into the Basin untreated.

4. Vegetation and Biological Resources

4.1 Vegetation

Vegetation in the project area consists primarily of trees and shrubs planted as landscaping for buildings and along streets. Along the river edge there exists low grass and weed growth, but there is no wetland vegetation since the shoreline is largely separated from the water by riprap and retaining walls. The vegetation in the North Station area is sparse, the largest open vegetated area, other than along the river, being a planted area near the MBTA tracks at Leverett Circle. This open space site contains the Bradford Callery Pear, Flowering Crab Apple, and Halka Honey Locust trees which are less common in an urban environment. Table V-10 includes a list of the vegetation varieties in the project area. None of the identified species in the project area is included in the Federal listing of rare or endangered species (50 CFR Part 17).

4.2 Wildlife

Although the North Station project land area is a dense urban environment which does not appear to include any animal population, it does support a small wildlife population common to urban areas. The Norway rat, (Rattus norvegicus), house mouse, (Mus Musculus), gray squirrel (Sciurus carolinensis), pigeon (Columbia livia), sparrows (fam. Ploceidae), seagulls (fam. Laridae), and starlings (fam. Sturnidae) can be found in this area.

The Charles River also is frequented by a variety of water fowl. The probability of sighting a particular species is dependent on the population size, the season, and the individual bird's habitats. The more natural areas of the river support a larger variety of wetland and aquatic species. However, the Charles River Basin does offer a unique urban habitat for semi-aquatic wildlife species.

Mallards (Anas platyrhynchos) are permanent inhabitants and breed in the Basin during the spring. Gulls that may feed in the Basin include the Ring-billed gull (Larus delawarensis), Herring gull (Larus argentatus), and Great Black-backed gull (Larus marinus). The American woodcock (Philohela minor), a spring migrant, and Black crowned night-heron (Nycticorax nyticorax hoactli) also have been observed near the Basin.(1)

4.3 Aquatic Biology

The aquatic biota in the Charles River Basin is indicative of its stressed, polluted environment. Due to the high turbidity levels which preclude adequate light penetration in the Basin, there is not

TABLE V-10

SPECIES OF TERRESTIAL VEGETATION FOUND IN NORTH STATION PROJECT AREA

Little Leaf Linden (*Tilia cordata*)

Gray Birch (*Betula populifolia*)

Tree of Heaven (*Ailanthus altissima*)

Shademaster Honey Locust (*Gleditsia triacanthos 'inermis'*, Shademaster)

Schwedler Maple (*Acer platanoides schwedleri*)

Privet (*Ligustrum*)

Bradford Callery Pear (*Pyrus calleryana*, 'Bradford')

Flowering Crab Apple (*Malus* species)

Halka Honey Locust (*Gleditsia triacanthos 'inermis'*, Halka)

Cottonwood (*Populus deltoides*)

Upright Yew (Hedge) (*Taxus media*, hedge variety)

Wormwood (*Artemisia vulgaris*)

Common Ragweed (*Ambrosia artemisiifolia*)

Foxtail (*Sectaria* species)

Source: Field survey

a significant algae population and the algae which do exist are dominated by planktonic forms. The Basin supports a dense but not overabundant phytoplankton population (1,000 to 15,000 cells per ml), with the least abundance and diversity in samples taken in 1955 near the Longfellow Bridge. Green algae (Chlorophyccae) are the dominant species. Monitoring of the MDC Destratification Project has not indicated any significant changes in algal populations.

In 1967, bottom sampling for invertebrates in the Basin revealed only one taxa of benthic invertebrates, a non-biting midge larva, downstream of the Longfellow Bridge. In general, the 1967 survey and a later survey in 1972 indicated a paucity of benthic organisms, particularly in the lower portion of the Basin, which was attributable to the anoxic conditions in the bottom water, unsuitable substrata, and direct toxic effects from pollutants in the water columns.(1)

In a 1979 biological sampling program at Longfellow Bridge, barnacles (Balanus sp.) and horse mussels (Modiolus modiolus) were found to cover the entire subsurface of exposed rocks along the embankment. Amphiphods (Gammarus fasciatus) and juvenile green crabs (Carcinua maenas) also were abundant on the rock surfaces. The only organism found in association with the soft bottom substrata were unidentified oligochaete worms.(2).

Suitable fish habitat in the Charles River is severely restricted since the bottom muck, as indicated above, supports few, if any, fish food organisms. In 1969 and 1975 the Massachusetts Division of Marine Fisheries and in 1979 the MDC conducted biological sampling to analyze the fish population in the Basin. Table V-11 indicates the results of these surveys. In summary, the Basin is dominated by freshwater and brackish water forage fish. Marine species such as striped bass and winter flounder also can be found occasionally. Anadromous fish formerly common in the River included Alewife (alosa pseudoharengus), blueback herring (alosa aestivalis), rainbow smelt (osmerus mordax), and American schrod (alosa sapidissima). Of these, the blueback herring has been recently observed in the Basin and the Massachusetts Division of Marine Fisheries is currently stocking the river with shad and shad eggs.*

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* It is interesting to note that as early as 3000 BC the Charles River was an important source of food for a thriving Indian population, as indicated by fishing weirs, fish debris, and other artifacts found near and along the banks of the river. This function continued throughout the Colonial era. Fish, including salmon, were plentiful and shellfish were abundant in the tidal estuaries. The estuary of the Charles, up as far as Watertown, contained extensive oyster beds, and the muds exposed at mean and low tides were jammed with large soft-shell claims (Mya arenaria). By the early 19th century, however, as a result of the Industrial Revolution, the fish had largely disappeared. The pollution from the industrial and human wastes also drove the oysters away and clams in the badly polluted mudflats were described as being "rather small and black" in a 1903 study for the construction of the Old Charles River Dam.

TABLE V-11

SPECIES OF FISH FOUND IN THE CHARLES RIVER BASIN

Species Common Name	Scientific Name	Presence 1969	 1975	 1979	Dominant Species	Sports Importance	Habitat
Largemouth bass	*Micropertus salmoides*	X	X			Yes	F
White perch	*Morone americana*	X	X*			Yes	B
Striped bass	*Morone saxatilus*	X				Yes	M
Yellow perch	*Perca flavescens*	X	X*			Yes	F
Pumpkinseed	*Lepomis gibbosus*	X	X*	X	X	Yes	F
Black crappie	*Pomoxis nigromaculatus*	X	X			Yes	F
Brown bullhead	*Ictalurus nebulosus*	X	X			Yes	F
White catfish	*Ictalurus catus*	X	X*			Yes	F
Menhaden	*Brevoortia tyrannus*		X*			No	M
Alewife	*Alosa pseudoharengus*	X				Yes	M
Blueback herring	*Alosa aestivalis*			X		-	M
Winter flounder	*Pseudopleuronectes americanus*		X*			Yes	M
Carp	*Cyprinus carpio*	X	X			No	F
Goldfish	*Carassius auratus*	X	X*			No	F
Bluegill	*Lepomis macrochirus*	X	X*			Yes	F
White sucker	*Catostomus commersoni*	X	X*	X	X	No	F

TABLE V-11 (Continued)

Species Common Name	Scientific Name	Presence 1969	 1975	 1979	Dominant Species	Sports Importance	Habitat
Tidewater silverside	Menidia beryllina		X*	X	X	No	B
Banded killifish	Fundulus diaphanus	X	X*	X	X	No	B
Golden shiner	Notemigonus crysoleucas		X*			No	F
Mummichog	Fundulus heteroclitus	X	X*	X		No	B
Spottail shiner	Notropis hudsonius		X*			No	F
Emerald shiner	Notropis atherinoides			X		No	F
American eel	Anguilla rostrata	X	X*	X		Yes	F

Habitat

F = Freshwater
B = Brackish water
M = Marine

*Only these species were found at a sampling station located between Longfellow Bridge and the old dam.

Source: Metcalf and Eddy, Inc., Combined Sewer Overflow, Charles River Basin Facilities Planning Area, Volume II. Environmental Assessment Report, June 13, 1980, prepared for Metropolitan District Commission, Pp. 3-20; 3-21.

Metropolitan District Commission, Environmental Quality Division, Fishing on the Charles River, Boston, 1978, pp. 29, 40.

As indicated previously, the Charles River Estuary Pollution Control Facility and the new dam should contribute significantly to the restoration of anadromous fish in the Basin by reducing polluted discharges from CSO's and the stratification caused by salt water intrusion. In addition, the new dam has incorporated into its design a "Hook" type fishway to allow anadromous fish to enter the Basin when the locks are closed. Fish from the Boston Harbor enter the fishway located at the northernmost end of the dam and swim through a series of 29 interconnected pools before reaching the Charles River Basin.

5. Wind Environment

Boston lies in the zone of prevailing westerly winds. According to the annual National Weather Service meteorological data for Boston, as measured at Logan Airport, winds from the southwest through the northwest are experienced about half the year, while winds from the southeast are least frequent, occurring only about 3% of the year (Figure V-21). Mean monthly wind speeds range from 10.9 m.p.h. in July and August to 14.4 m.p.h. in January and February. Winds of 32 m.p.h. or higher may be expected at least once a month, and gales are both more common and more severe in the winter months. The strongest storm winds are from the northwest. These data indicate that the Boston area in general, and relatively open and undeveloped sites like the North Station area in particular, are subjected to a relatively high regional wind environment.

Wind speed and direction vary according to the season. Winter and early spring winds are predominantly from the northwest or west-northwest, which directions also exhibit the highest percentages of winds in excess of 25 m.p.h. - wind speeds which could be hazardous to pedestrians. Nearly 30% of the winter/early spring winds originate from these two directions. Severe winds generally range to 40-50 m.p.h. in the winter and spring months. Summer winds show a strong predominance of southwesterly winds (32% are WSW, SW and SSW), but far fewer winds in excess of 25 m.p.h. There are also significant easterly and northwesterly winds*. Monthly extremes are in the 25 to 45 m.p.h. range. Late spring and fall winds are more evenly distributed around the compass, but the northwest and southwest quadrants still predominate, with the easterly quadrant also significant.

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* Summer wind measurements at the North Station project area, however, while confirming the high frequency of southwesterly winds, did not indicate significant northwest or easterly winds, as measured at Logan Airport. The east wind in particular probably was due to sea-breezes, which are expected to be more fully developed at the Logan environment than at North Station.

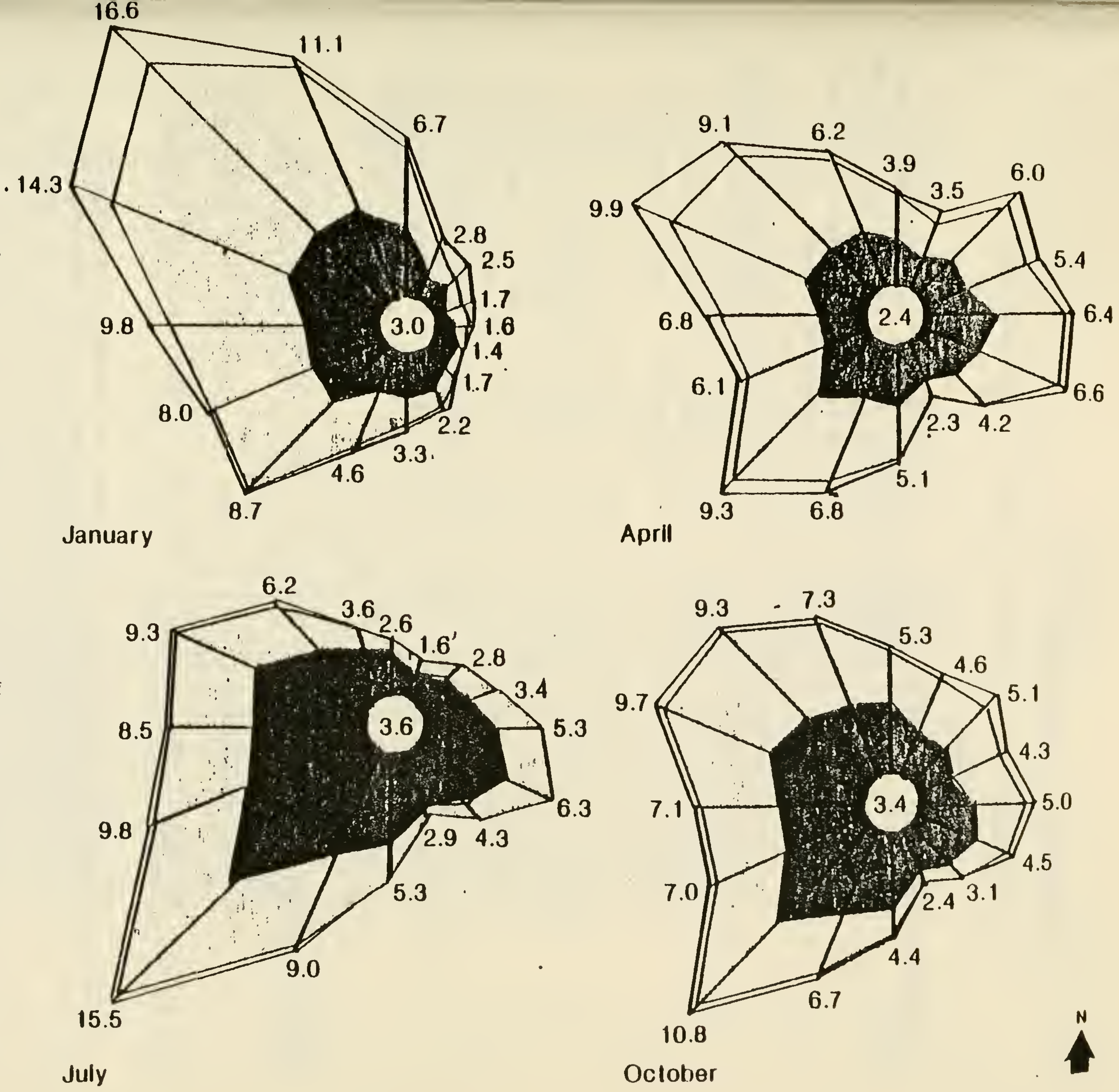
Figure V-21

SEASONAL WIND ROSES
LOGAN AIRPORT,
1950-1964

Speed Categories:

- ○ *0-3 mph, center*
- ■ *4-12 mph, 1st segment*
- ▨ *13-24 mph, 2nd segment*
- ☐ *25 mph, 3rd segment*

The numbers represent the percent of time that the wind blows from the indicated direction.



D. Environmental Characteristics

1. Air Quality

1.1 Background

National Ambient Air Quality Standards (NAAQS) have been established for seven major pollutants by the Clean Air Act of 1970 and subsequent amendments. These pollutants are: total suspended particulates (TSP), sulfur dioxide (SO_2), carbon monoxide (CO), nonmethane hydrocarbon (NMHC), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb).* Roadway vehicles constitute a significant source of CO, NMHC, Pb, and nitrogen oxides (NO_x) and can be indirectly responsible for high ambient concentrations of ozone, which result from the photochemical interaction of NO_x and NMHC. Sulfur oxides and particulates are emitted primarily from stationary sources, *i.e.*, industrial stacks, power plants, incinerators, and space heating.

The primary standards specify exposure periods for each pollutant based on studies of health effects. All of the pollutants listed affect the human physiological system directly except for hydrocarbons, the nonmethane component of which contributes indirectly to photochemical smog through a series of chemical reactions with NO_x and other substances in the atmosphere in the presence of sunlight. In addition to the primary standards, secondary standards were established to prevent other adverse effects of air pollution, such as damage to personal property and vegetation. The Federal standards, presented in Table V-12, also have been adopted by the Commonwealth of Massachusetts. A summary of the sources and effects of these pollutants is presented in Appendix E.

The 1970 Clean Air Act also established a target date for the attainment of primary standards by May 31, 1975, and for secondary standards, within a reasonable time period. Subsequently, the Clean Air Act amendments of 1977 extended the attainment date to December 31, 1982, with the implementation of "all reasonably available control measures". States also were required to submit revised implementation plans by 1979 for attainment of the standards.

In areas with severe carbon monoxide or photochemical oxidant (ozone) problems, where standards might not be met by 1982 despite all reasonable efforts, a postponement of the attainment deadline until 1987 was provided, under certain conditions. This provision also mandated a second plan, to be submitted in 1982, requiring the implementation of "enforceable measures" if strategies proposed in the 1979 submittal were demonstrably inadequate to meet the 1987 deadline for attainment of primary CO and O_3 standards. The Massachusetts Department of Environmental Quality Engineering (DEQE) did not anticipate attainment in Boston by 1982 and an extension to 1987 was granted. A revision of the 1979 Massachusetts State Implementation Plan (SIP) was submitted to EPA July, 1982, and was approved on November 4, 1983.

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* On January 5, 1983, however, the EPA revoked the primary and secondary standards for hydrocarbones (48 FR 628).

Table V-12

MASSACHUSETTS AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Criteria Pollutant	Averaging Interval(1)	Primary Standard		Secondary Standard	
		(ug/m^3)	(ppm)	(ug/m^3)	(ppm)
Sulfur Dioxide (SO_2)	Annual	80	0.03	-	-
	24-hr	365	0.14	-	-
	3-hr	-	-	1,300	0.5
Total Suspended Particulate (TSP)	Annual	75(2)	-	60(2),(3)	-
	24-hr	260	-	150	-
Nitrogen Dioxide (NO_3)	Annual	100	0.05	100	0.05
	1-hr(4)	320	0.16	-	-
Carbon Monoxide (CO)	8-hr	10(5)	9	10(5)	9
	1-hr	40(5)	35	40(5)	35
Ozone (O_3)	1-hr(6)	240	0.12	240	0.12
Lead (Pb)	3-month(7)	1.5	-	1.5	-

NOTES:

1. 1-hr, 3-hr, 8-hr, and 24-hr standards not to be exceeded more than once per year. Arithmetic mean for 3-month and annual standards except particulate matter.
2. Annual geometric mean.
3. For use as a guide in assessing implementation plans to achieve the 24-hr standard.
4. Massachusetts Department of Environmental Quality Engineering guideline, applicable only to major sources of oxides of nitrogen.
5. Carbon monoxide standards are shown in units of mg/m^3.
6. Standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above standard, is equal to or less than one.
7. Maximum arithmetic mean average over a calendar quarter.

In order to meet the air quality standards, the EPA promulgated controls and regulations respecting pollutant emissions from various sources, including the Federal Motor Vehicle Control Program (FMVCP) to limit motor vehicle emissions. In localities where motor vehicle emission controls were inadequate to insure attainment or maintenance of ambient standards, more restrictive Transportation Control Plans (TCP) also were required. The EPA determined that Boston was one such area, and in 1975 the agency promulgated a TCP for the Metropolitan Boston Air Quality Control Region (AQCR). The objective of the TCP is to reduce CO and O_3 levels in the region by a variety of measures aimed at decreasing vehicle miles travelled. These measures include a "freeze" on the construction of new commercial parking facilities in downtown Boston and at Logan Airport to discourage automobile trips into these areas, greater use of carpooling, bicycles and mass transit, and the inspection and maintenance of emission control equipment on cars. Until recently, only elements of the parking management program and commuter automobile use reduction measures had been implemented to any degree. The EPA has indicated that its primary strategy for the reduction of mobile source air pollution in Massachusetts is the implementation of the inspection and maintenance (I/M) program, which went into effect on April 1, 1983.

1.2 Ambient Air Quality Levels

The basis for determining whether air quality levels are in compliance with standards is data collected from monitoring stations operated by the Massachusetts Air Monitoring Network within each AQCR and reported to the EPA. The closest monitoring stations to the North Station project area are located at Brennan Street in East Boston (1.4 mile distant) and at Kenmore Square (2.1 miles distant). (A station previously existed at Science Park (Museum of Science) adjacent to the project area but did not conform to EPA criteria for monitoring station location.) The most current (1981) air quality data available for these stations are summarized in Table V-13.

Observed data indicate that there were no violations of primary or secondary standards for SO_2 or TSP within Boston, although high levels of particulates do occur in the Boston area*. Nitrogen oxide levels are well within Federal annual standards but do exceed the Massachusetts guideline for short-term exposure. Maximum ozone levels (measured in East Boston in 1981) did not exceed the 0.12 ppm standard, but levels at sites north and south of the city previously have been well in excess of the standard and the entire state is designated as non-attainment by the EPA.

Both Kenmore Square and 600 Washington Street recorded violations of the 8-hour CO standard of 10 mg/m^3 (9 ppm) in 1981 while the one-hour levels were well below the standard of 35 ppm. Carbon monoxide

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* However, due to insufficient data, Boston officially is unclassified with respect to TSP. Also, there are currently no EPA approved measurements available for lead levels.

Table V-13

1981 Annual Summary of Air Quality Data
Boston, Massachusetts

Total Suspended Particulates (ugm/M^3)

Site	Max. 24 Hour Obs.	2nd Max. 24 Hour Obs.	# of Obs. Above 260	# of Obs. Above 150	Annual Geom. Mean
68 Central Sq., E. Boston	102	95	0	0	53
South Bay	111	98	0	0	55
Bremen St., E. Boston	109	88	0	0	44
200 Columbus Ave.	123	97	0	0	62

Sulfur Dioxide (ugm/M^3)

Site	Max. 24 Hour Obs.	Max. 3 Hour Obs.	Annual Arith. Mean
Kenmore Square	180	343	50
Kneeland Street	189	296	42
Bremen Street	126	215	37
Morrissey Blvd.	178	288	29

Carbon Monoxide (mg/M^3)

Site	Max. 1 Hour Obs.	2nd Max. 1 Hour Obs.	Max. 8 Hour Obs.	2nd Max. 8 Hour Obs.
Kenmore Square	22.0	16.0	14.0	10.0
Bremen Street	12.0	12.0	10.0	8.0
600 Washington Street.	22.0	22.0	14.0	12.0

Ozone (ppm)

Site	Max. 1 Hour Obs.	2nd Max. 1 Hour Obs.	# of Obs. Above 0.12
Bremen Street	0.115	0.095	0

Nitrogen Dioxide (ugm/M^3)

Site	Max. 1 Hour Obs.	2nd Max. 1 Hour Obs.	Arithmetic Mean
Kenmore Square	376	367	71
Bremen Street	214	207	55

Source: Massachusetts Air Monitoring Network, Division of Air Quality Control, DEQE.

concentrations, however, are highly sensitive to location. Consequently, in order to measure ambient levels of CO in the North Station project area, a three-month continuous monitoring program was initiated by Bolt Beranek and Newman, Inc., in early July, 1980, at a site on Causeway Street opposite the North Station building, and four short-term satellite sites were established at major intersections in and around the project area. These intersections included: a) Leverett Circle, b) Staniford/Merrimac/Causeway Streets, c) New Chardon and Merrimac/Canal Streets, and d) North Washington and Causeway Streets (Keany Square). The location of the individual sampling sites are shown on Figure V-22.

The results of this measurement program are presented in Table V-14. Detailed descriptions of the monitoring program and methodology are presented in Appendix F.(1)

The maximum recorded 1-hour CO concentration in the North Station area was 26.4 parts per million (ppm), which was reported by the NDIR (nondispersive infrared) site at Causeway Street. At the satellite sites, the measured maximum 1-hour CO concentrations were generally lower, ranging from a 5.4 ppm level at the LC 3 site at Leverett Circle to a 24.8 ppm level at the NW1 site at Keany Square. No exceedance of the 1-hour standard of 35 ppm was recorded anywhere. However, during this interim reporting period, four sites did report violations of the 8-hour standard of 9 ppm. The maximum 8-hour concentration recorded was 17.6 ppm at the North Washington/Causeway intersection-NWI site. This level represents exceedance of the standard by over 95%.

In addition to the NDIR probe on Causeway Street (which was located below the MBTA elevated tracks to measure entrapment of CO), an Ecolyzer was placed above the tracks and sampled on alternate days. Maximum 1-hour concentration measured by the Ecolyzer was 21.1 ppm and the maximum 8-hour, 10.0 ppm. The difference in the NDIR and Ecolyzer measurements reflect the fact that the NDIR probe, being located below the MBTA tracks, is closer to the emission sources on Causeway Street and is more responsive to high CO levels related to transient event-oriented episodes, such as idling motor vehicles or traffic congestion in the vicinity of the site, than the Ecolyzer probe located above the MBTA tracks.

Overall, the existence of the Green Line does little to alter the air quality in the project area, since the transit cars, being electrically driven, produce no direct air pollutants. The rails are elevated through the project area, posing little at-grade conflicts with vehicular traffic. However, as noted above, the elevated structure does marginally affect air quality directly below it on Causeway Street, by interfering slightly with traffic flow and by imposing a capping affect on the air space below it. Thus, street-grade emissions from vehicles under the elevated structure do not disperse in the atmosphere as freely as those from traffic on an open street.

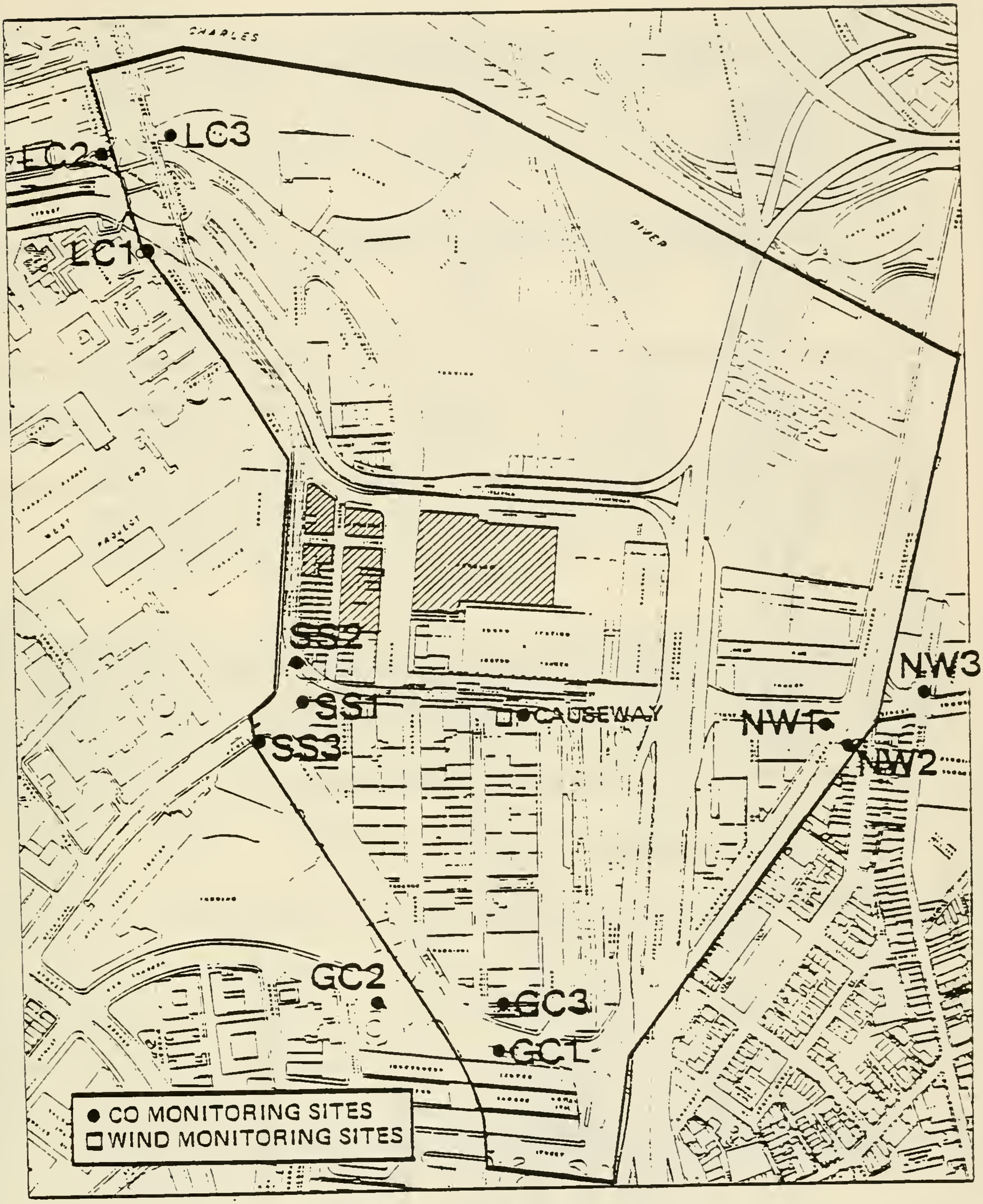

FIG. V-22: PROJECT AREA SHOWING CARBON MONOXIDE AND WIND MEASUREMENT LOCATIONS.

TABLE V-14: MEASURED AMBIENT CARBON MONOXIDE CONCENTRATIONS IN THE NORTH STATION AREA FOR 9 JULY -- 15 OCTOBER, 1980.

Site Description	Concentrations in Parts per Million (ppm)					
	1-hr			8-hr		
	First Maximum	Second Maximum	No. of Times >Standard (35 ppm)	First Maximum	Second Maximum	No. of Times >Standard (9 ppm)
Canal & Causeway*						
NDIR	26.4	24.0	0	13.8	13.7	7
Ecolyzer	21.1	14.5	0	10.0	9.8	5
Satellite Monitors**						
North Washington & Causeway						
NW1	24.8	22.3	0	17.6	16.6	2
NW2	11.0	11.0	0	5.8	3.9	0
NW3	11.4	10.4	0	9.0	7.5	0
Leverett Circle						
LC1	13.1	12.7	0	9.2	8.1	1
LC2	7.8	5.9	0	4.4	4.4	0
LC3	5.4	5.3	0	4.2	2.5	0
Staniford/Merrimac/Causeway						
SS1	9.6	7.5	0	5.3	5.2	0
SS2	9.0	6.9	0	5.3	4.3	0
SS3	12.1	11.5	0	6.0	3.2	0
New Chardon/Canal						
GC-1	11.7	9.6	0	7.6	6.5	0
GC-2	11.6	9.5	0	7.5	6.9	0
GC-3	6.2	6.1	0	4.9	3.4	0

* 3-month monitoring period

** 3-day monitoring only

Source: Bolt Beranek and Newman Inc., Report No. 4477, Table E-5.

In comparison with maximum readings reported from the State-operated monitoring stations in Boston (Table V-13), the above results suggest that the North Station area, like other parts of the City, generally does not have a problem with respect to the 1-hour standard but does have an attainment problem with respect to the 8-hour standard. Data from the short-term monitoring sites, based on only three days of data, are statistically too insignificant to draw any definite conclusions. For example, during the three days of measurements at Leverett Circle, the wind speed generally was very high, and the wind was observed to be from directions that were not expected to lead to high CO concentrations at the monitor.*

1.3 Modelled Carbon Monoxide Concentrations

Current (1980) CO concentrations also were estimated at selected receptors in the North Station area and environs in order to provide a basis for determining the impact on air quality of the proposed project. These receptor locations are shown in Figure V-23 and are listed, with the modelling results, on Table V-15. The receptors were chosen to predict concentrations at the CO monitoring sites, at several intersections in and around the project area, and at sensitive locations such as the Rehabilitation Hospital and existing and future residential and recreation areas.

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* However, the summer 1980 measurements at Leverett Circle were substantiated by additional monitoring conducted in the winter of 1982 for the Third Harbor Tunnel EIS/EIR. These short-term measurements did not indicate any violation of either the 1-hour or the 8-hour standard, although the Martha Road site (LC1) did record an 8-hour average concentration very close to the standard:

		Concentrations (ppm)*			
		1-hour		8-hour	
	Date	High	Low	High	Low
LC1 Martha Road	2/16/82	11.3/5.8	2.6/0.5	8.5/3.9	7.2/2.2
LC2 MDC Police Lot	and	5.7/6.6	1.4/3.1	3.7/5.4	3.4/4.1
LC3 DPW Parking	3/13/82	5.4/9.3	0.9/1.1	3.3/4.9	2.0/2.9

* Data give maximum and minimum for each of the two days of monitoring.

Source: U.S. Department of Transportation/Federal Highway Administration, Draft Environmental Impact Statement/Report - Third Harbor Tunnel Project, Interstate 90, Boston, Massachusetts (FHWA-MA-EIS-82-02-D), December 1982, Table 8.

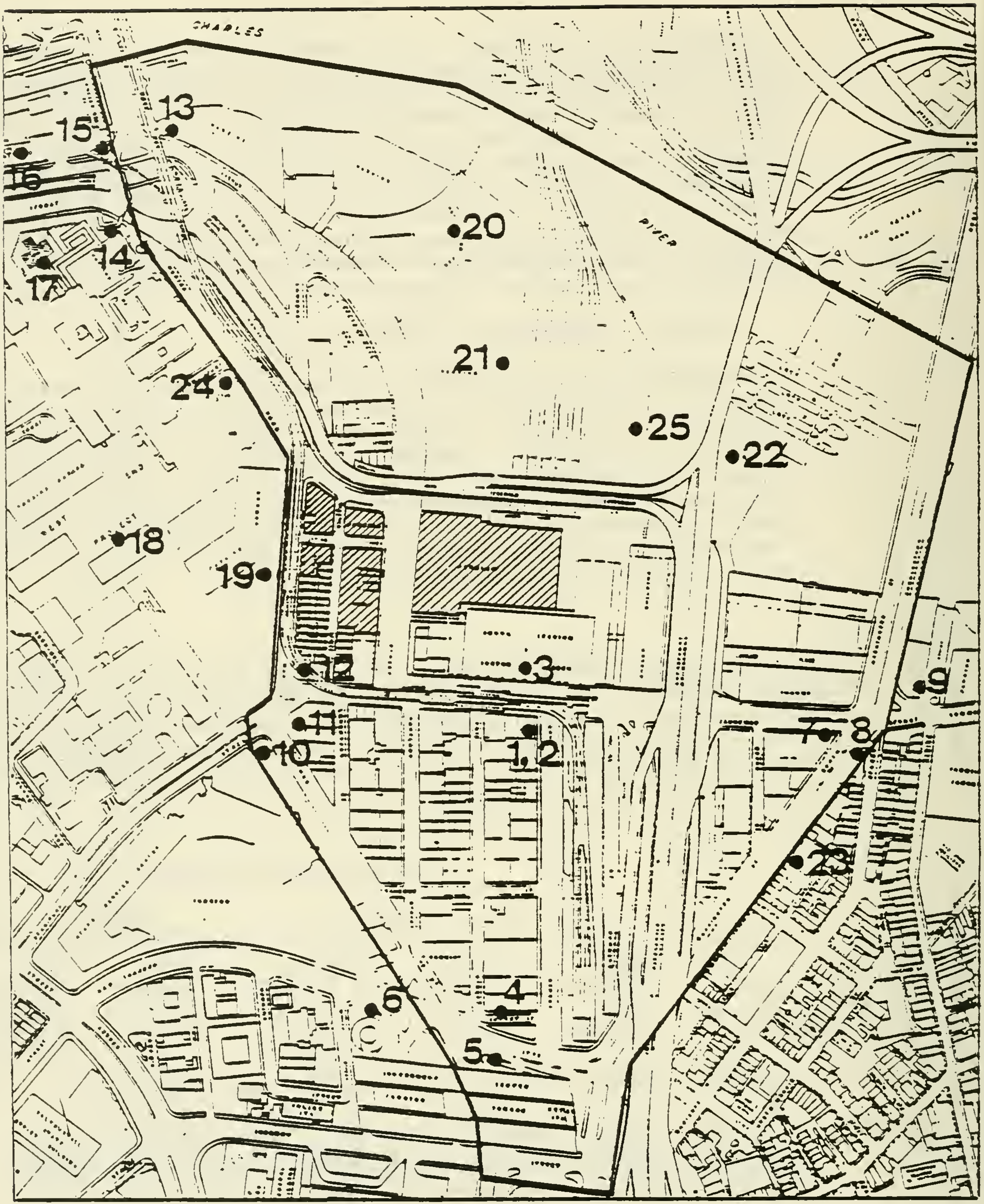


FIG. V-23: PROJECT AREA SHOWING LOCATIONS OF RECEPTORS USED IN CARBON MONOXIDE MODELING ANALYSIS

TABLE V-15

MODELLING PREDICTIONS OF CURRENT (1980) CARBON MONOXIDE CONCENTRATIONS, IN PARTS PER MILLION, AT SELECTED RECEPTOR LOCATIONS AT NORTH STATION

Receptor Locations	1980	
	Existing	
	1-Hr	8-Hr
1. Canal and Causeway Monitoring Site - 2nd Floor	21.7	3.3
2. Canal and Causeway Monitoring Site - 4th Floor	16.7	7.0
3. Causeway at North Station	15.6	6.7
4. Friend and New Chardon	20.1	8.4
5. New Chardon and Merrimac	21.3	8.4
6. New Chardon and Garage entrance	11.0	5.0
7. Causeway, EB and Washington	40.3	15.3
8. N. Washington, NB and Causeway	35.4	12.2
9. Causeway WB and N. Washington	29.8	10.6
10. Stanford and Merrimac	17.9	8.0
11. Merrimac and Causeway	15.3	6.8
12. Lomasney Way and Causeway	13.1	6.4
13. Leverett Circle - Nashua St.	17.9	8.2
14. Leverett Circle - Martha Way	22.2	9.2
15. Leverett Circle - Charles River Dam	23.4	9.8
16. Leverett Circle - Charles St.	23.1	9.1
17. Leverett Circle - Charles River Park Apts.	14.3	6.4
18. West End Project	10.7	4.8
19. Lomasney Way	10.9	5.8
20. Mass. Rehab. Center	11.7	5.0
21. Project Area, Sub Area II	14.3	5.6
22. Project Area, Public Area Near River	19.4	7.1
23. North Washington St. and Thatcher Court	19.1	7.4
24. Martha Road - Amy Court	19.4	7.8
25. Project Area, by Canal near Museum/Park	20.4	6.7

Source: Bolt Beranek and Newman Inc.
Report No. 4477, Tables I-5, I-6.

The modeling predictions of maximum 1-hour CO concentrations at North Station included an assumed background level of 4.4 ppm for the 1980 base case. This background level was selected using techniques outlined in EPA's CO hot spot guidelines.(2) An eight-hour background level was established by applying a .75 persistence factor to the one-hour level.

The 1-hour CO concentration modeling estimates for 1980 indicated concentrations ranging from 10.7 ppm to 40.3 ppm. The 1-hour CO standard of 35 ppm was exceeded at two of the twenty-five receptor locations modelled. The highest concentrations were found at Leverett Circle and at the intersection of North Washington Street and Causeway Street. Eight-hour concentration estimates ranged from 4.8 ppm at the West End project to 15.3 ppm at Keany Square, the 8-hour standard of 9 ppm being exceeded at five of the receptor locations.

In comparison with the measured concentrations, it can be noted that the modelling prediction generally showed higher levels of CO (no exceedences of the 1-hour standard were recorded at any of the monitoring sites and the 8-hour standard was violated at only four of the sites). This difference may be explained, in part, by the fact that the modelling program predicted worst-case concentrations. Since no specific meteorological data were available for those sites, the estimates assumed worst-case meteorological conditions (wind speeds of 1 m/sec. (1-hour) and 3 m/sec. (8-hour), Stability Class D, mixing height of 100 m.). Also, maximum traffic volumes and low levels of service were assumed, whereas observation during the monitoring period indicated substantially less traffic was present, resulting in higher levels of service. However, a limited model validation conducted at the Causeway Street site showed that the model was underpredicting by about 16% at this location; the worst-case 1-hour modelling prediction was 22.1 ppm whereas the maximum 1-hour ambient CO concentrations measured at the same location was 26.4 ppm.

2. Noise Environment

2.1 Background

The noise environment of a typical urban area is generally defined by an ambient, or steady "background" noise, which is the sum of many different noise sources (commercial activity, heating and air conditioning equipment, the multitude of motor vehicles operating throughout an area), upon which is superimposed the noise of individual local sources, such as passing vehicles or occasional aircraft flyovers.

Noise levels are commonly measured on an A-weighted decibel scale, or dB(A), which simulates the human perception of noise, particularly its annoying aspects. Since the dB(A) scale is logarithmic, changes in dB(A) levels do not follow simple arithmetic relationships. Thus, if the sound intensity in any area is doubled, there will be an increase of only 3 dB(A), which is barely detectable. To the human ear, however, sound will appear twice as loud with an increase of approximately 10 dB(A). Noise levels associated with common sources of noise are indicated on Figure V-24.

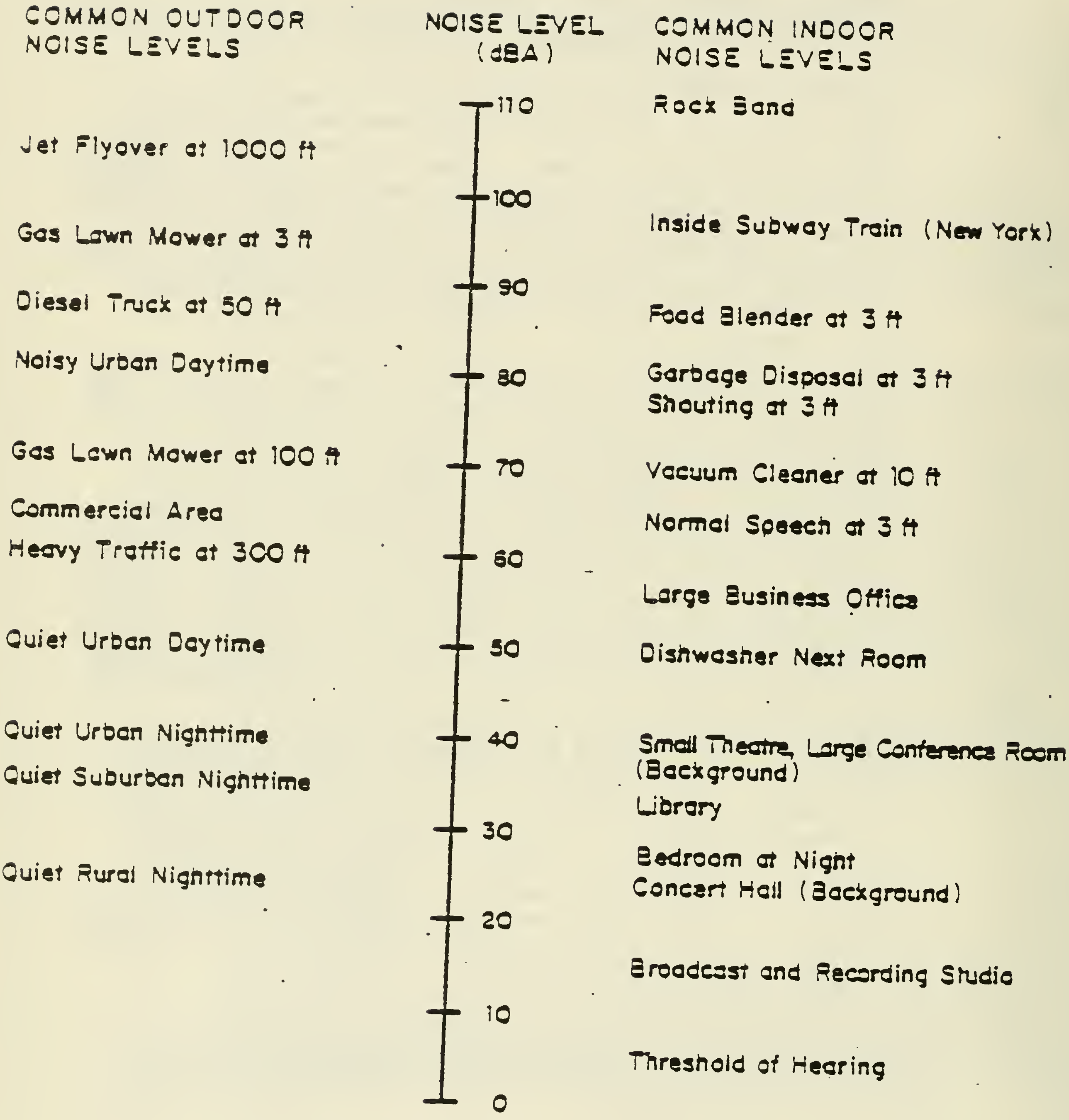
In assessing potential noise impact, both the time fluctuations of the noise level and maximum noise levels are important. Noise fluctuations may be described by determining those levels exceeded a certain percentage of the time. Hence, for a specific time period, the L_{90} level describes the noise level exceeded 90% of the time and is generally considered as "background" noise. The L_{10} level (or the level exceeded 10% of the time) is normally indicative of higher noise levels occurring during the time period and, in the case of urban communities, indicates the character of localized traffic noise sources. The L_{50} level represents the median noise level.

Another method of quantifying the noise environment is to determine the value of steady-state sound which has the same A-weighted sound energy as that contained in the time-varying sound. This is termed the Equivalent Sound Level (L_{eq}). The L_{eq} is a single value of sound level for any desired duration, which includes all of the time-varying sound energy in the measurement period. The major virtue of the L_{eq} is that it correlates reasonably well with the effect of noise on people, even for wide variations in environmental sound levels and time patterns. It is used when only the durations and levels of sound, and not their time of occurrence (day or night), are relevant. The day/night equivalent noise level (L_{dn}) is the L_{eq} for a 24-hour period with an additional 10 dB(A) weighting added to the nighttime noise levels (10 p.m. - 7 a.m.). L_{dn} and L_{eq} are the noise values now used by HUD and EPA in their acceptability criteria.

In addition to absolute noise levels, an increase in the existing ambient will be perceived as in intrusion or impact by people who customarily use an affected area. Changes in noise levels create an impact which is roughly proportional to the increase. Emperical studies have shown that, in an urban environment, people can begin to distinguish changes in noise levels of approximately 5 dB(A). Lesser changes are generally considered insignificant and imperceptable. For changes above 5 dB(A), it is commonly accepted that increases of 5-15 dB produce "some impact" while noise level increases of more than 15 dB are usually considered severe.

2.2 Ambient Noise Levels

The only known ambient noise measurements available for the North Station area are two measurements taken in connection with a preliminary Central Artery depression study in 1974, (1) the results of which are indicated below.



COMMON INDOOR AND OUTDOOR NOISE LEVELS.

Figure V-24

Location	Time of Day	dB(A) L_{10}	L_{50}	L_{90}
1. Causeway Street underneath Expressway	5:30 p.m.	79	75	73
2. Haverhill & Causeway Streets	7:00 p.m.	90	73	69

These data indicate the high noise levels characteristic of dense urban centers. At Site 1, the range from L_{10} to L_{90} is fairly small (6 dB(A)), suggesting that high noise levels are a constant, rather than intermittent, phenomenon. At Site 2, the high L_{10} level recorded resulted from the former elevated rapid transit operation in the area. Moreover, the elevated structure constituted an effective roof over Causeway Street, producing a downward reflection of noise toward the street that might otherwise have dispersed upward. This reflective effect is one possible reason for the high noise levels at grade on Causeway Street. These measured levels exceed the Federal Highway Design Noise levels for commercial, industrial, and other relatively noise-insensitive uses (75 dB(A)).

According to the latest available (1980) noise contour map for Logan Airport (Figure V-25) the North Station project area is located outside the DNL 65 dB contour, and the distance from the area to the impacting flight paths are more than double the distance from the DNL 65 dB contour to the flight paths. Based on HUD methodology for the evaluation of site exposure to aircraft noise, it is estimated that the contribution of Logan Airport to the ambient noise levels is 57.4 dB(A).

In order to determine base-line conditions for future noise predictions, existing noise levels at three noise-sensitive locations within and adjacent to the project area were modelled by Bolt Beranek and Newman, Inc., (see Appendix G-1).(2) Additional noise modelling, together with a more detailed measurement of the effect of wayside impact noise (roar) from the existing Green Line elevated, was undertaken by the MBTA as part of the Green Line Alternatives EIS, (Appendix G-2). Table V-16 indicates the location of the receptor sites and the modelled L_{dn} levels, based on the separate consultant studies for the BRA and MBTA.

Roar depends on train velocity, condition of the rails and wheels, and the nature of the elevated structure. Reportedly, the elevated portion of the Green Line between the Haymarket portal and Science Park Station produces a very low wayside noise impact relative to other MBTA elevated structures and to other elevated structures in major cities across the nation. Two significant reasons appear to account for this. First, the structure of this elevated consists of rails laid on ties and ballast, and not the open girder construction which radiates more wayside noise. The other reason is that the

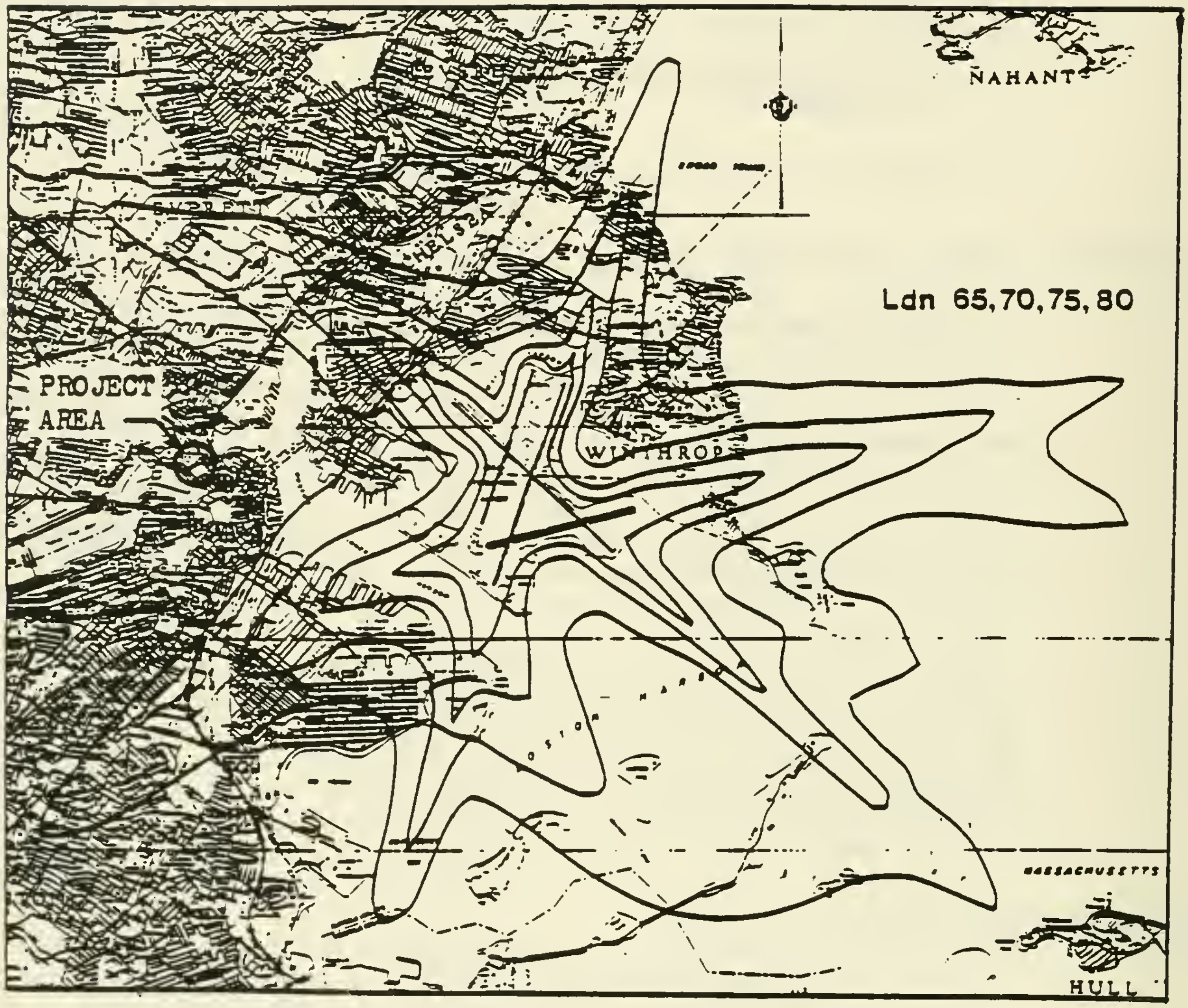


Figure V-25: 1980 L_{dn} Noise Contours - Logan Airport

Table V-16

Existing L_{dn} Noise Levels at North Station (Modelled)[1]

Receptor Location	Roads	Rail	Transit	Total	Contribution of Transit L_{dn}
	Noise Source				
1. Massachusetts Rehabilitation Hospital	72	79	50	80	-
4. Charles River Park housing, facing Martha Road	71.0	-	63.4	71.7	0.7
5. North Washington Street residences, near Thatcher Street	73.0	-	55.5	73.1	0.1
9. Lomasney Way, near Cotting Street	75.0	-	68.7	75.9	0.9
10. Causeway and Lancaster Streets	72.0	-	68.4	73.6	1.6
11. Causeway and Canal Streets	72.0	-	63.7	72.6	0.6

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[1] Sources:

Receptors 1,4,5: Bolt Beranek and Newman, Inc., Air Quality and Noise Impact Analyses of the North Station Urban Renewal Project, (K.M. Chng et al), Report No. 4477, Cambridge, April, 1982.

Receptors 4,5,9,10,11: U.S. Department of Transportation, Urban Mass Transportation Administration, Draft Environmental Impact Statement - Boston Green Line at North Station: Alternative Improvements (Preliminary Draft), Washington, July, 1981.

N.B.: "-" indicates the source contributes no significant noise at the receptor location.

background vehicular noise in the project area is of such magnitude that the L_{dn} of the transit operations does not constitute a significant increment in the noise levels at nearby receptors. As Table V-16 indicates, in no case does the transit operation increase the daily noise level by more than 2 dB(A), and most contributions are less than 1 dB(A). Since 3 dB(A) is approximately the lowest increment in noise level perceptible to humans, the Green Line elevated contributes an insignificant amount of total noise to the project area.

A second, and more irritating, noise from the Green Line elevated is squeal noise, which approximates a pure, high-pitch tone and is produced by rigid axle wheels travelling along tight curves with a radius of curvature less than 200 feet. The present elevated produces significant squeal noise from the wheels of the older PCC cars at two locations - at Causeway Street and Lomasney Way, a curve of approximately 190-foot radius, and at Causeway and Canal Streets, a curve of approximately 100 feet radius. The level of squeal, however, can be reduced by preventing the wheels from ringing, using wheel dampers, or using wheels of complex composition which include a resilient layer. Current MBTA noise abatement programs include the modification or replacement of old PCC car wheels with damped wheels. Newer LRV cars with damped wheels are already lessening the amount of squeal noise significantly.

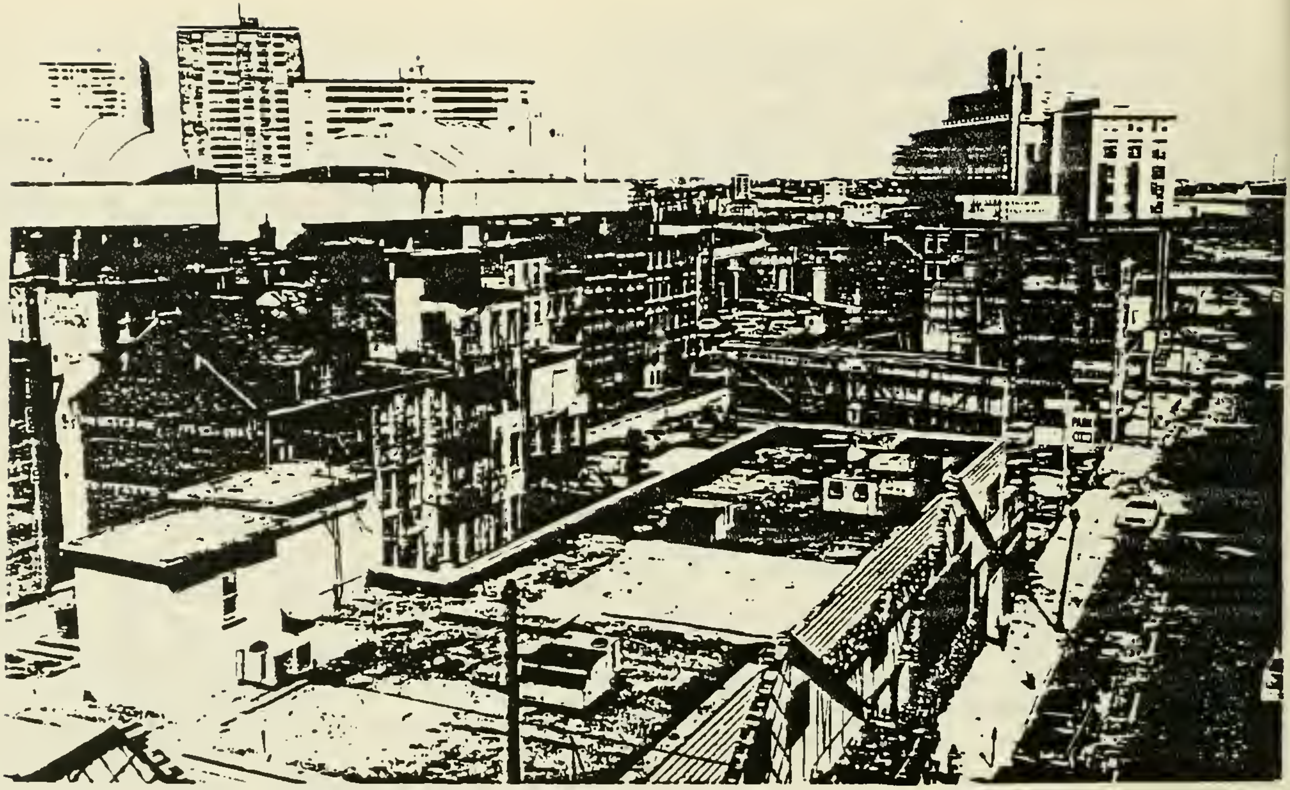
E. Aesthetic and Urban Quality

The aesthetic environment of the North Station project area is generally considered to be unattractive. From the river's edge to the Bulfinch Triangle, the area has suffered from an absence of public or private investment in improvements (with the exception of the construction of the Rehabilitation Hospital in 1969) and, as a result, the aesthetic environment has deteriorated. It is in response to this degraded environmental quality that the BRA has proposed an extensive redevelopment effort to upgrade the image and function of the North Station district and to maximize this valuable, but underutilized, land resource. Figures V-26 to V-31 indicate characteristic views and conditions found in the project area.

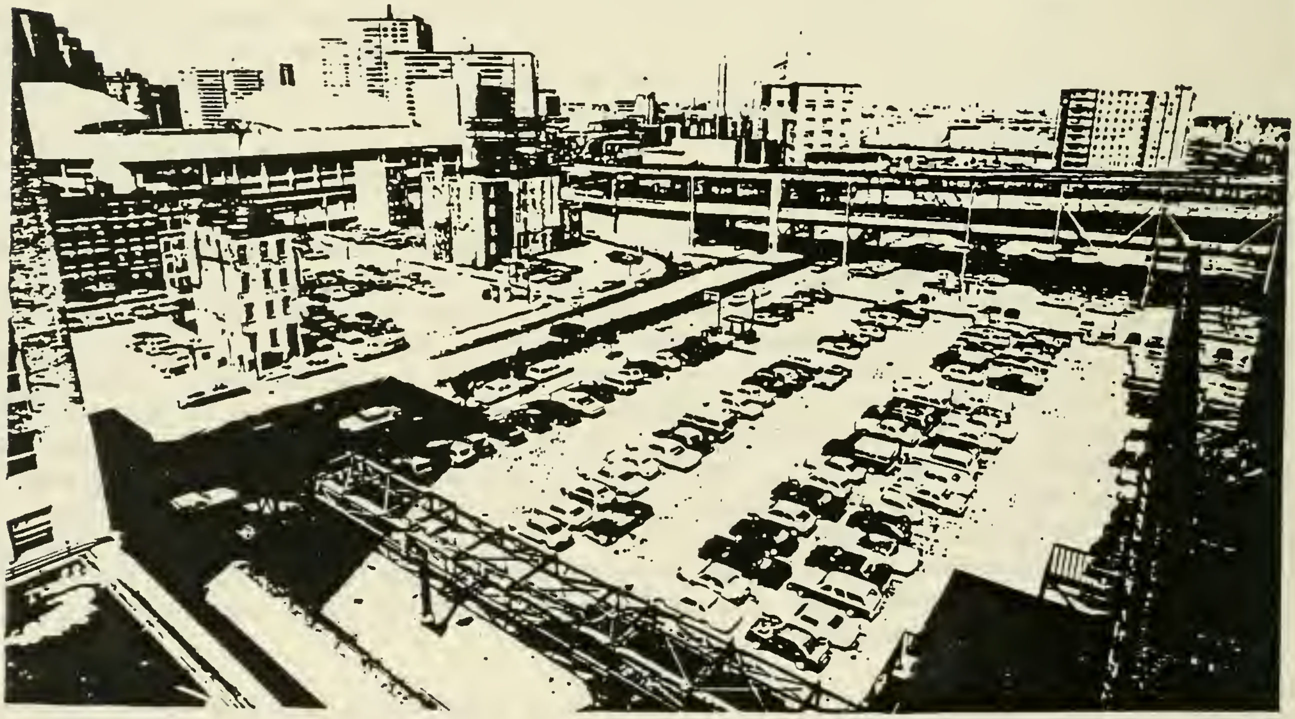
The sub-area between the Expressway ramps and the edge of the Charles River is primarily a large expanse of parking which surrounds the MDPW/Registry Building, the Massachusetts Rehabilitation Hospital, and the commuter railyard. Whether viewed from an automobile on the elevated expressway or as a pedestrian at grade level, this area appears to be a giant, unlandscaped parking lot. Planning for the automobile obviously has been paramount in the past, with concern for pedestrian amenities being of secondary importance. The river's edge is characterized by dumped debris (often illegal) and wild weed growth, and no attempt has been made to convert this resource into an attractive urban amenity, even though proposals to extend the Esplanade parkland into the area have existed for several years. None of the vehicular or railroad storage is shielded from the view of pedestrians or motorists. The presence of the elevated expressway structure only seems to enclose this neglected urban "room". In addition, the Storrow Drive Connector ramps and the parking lots act as barriers against public access to the riverfront. In its visual survey of the area for the urban renewal plan, the BRA noted that "substandard and blighting conditions exist to a degree and extent which is (sic) detrimental to the safety, health, welfare, and sound growth of the community" (Urban Renewal Plan, Section 2.3.1.1).

The North Station/Boston Garden sub-area includes active land uses on Causeway Street adjacent to the Green Line elevated structure and in a small developed area between Nashua Street and Lomasney Way. Perhaps the most negative aesthetic influence in the area is the elevated transit structure. Although the structure itself is not entirely unattractive, it does preclude light from the street level and forms a dark, noisy urban corridor. Removal of this structure, a stated redevelopment goal, would once again allow fresher air and sunlight to reach the street and promote a renewed "image" of the district's most important street. Substantial deterioration of the Billerica Street blocks over the years has resulted in the demolition of several buildings, producing a visually unattractive mixture of small surface parking lots, commercial signs, and half-vacant residential uses.

A further discussion of project area conditions and the urban quality of the North Station district is found in Section B.1.2 above.

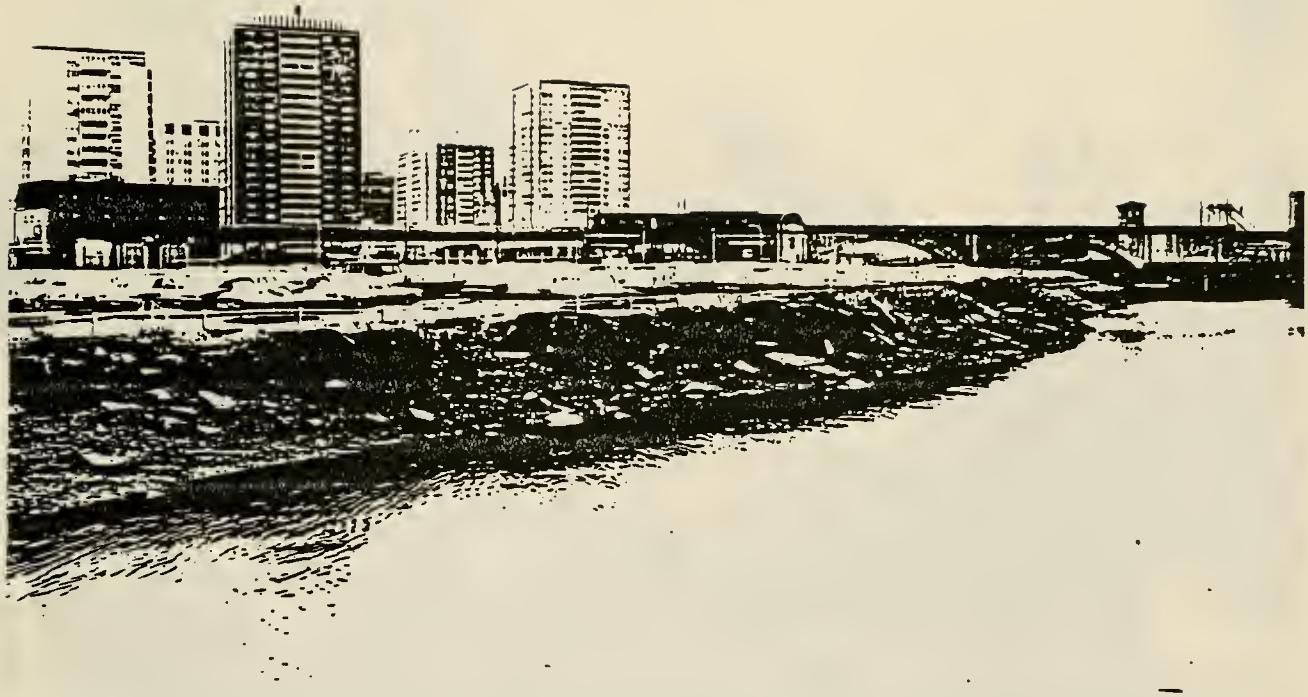


(a) Billerica Street Blocks

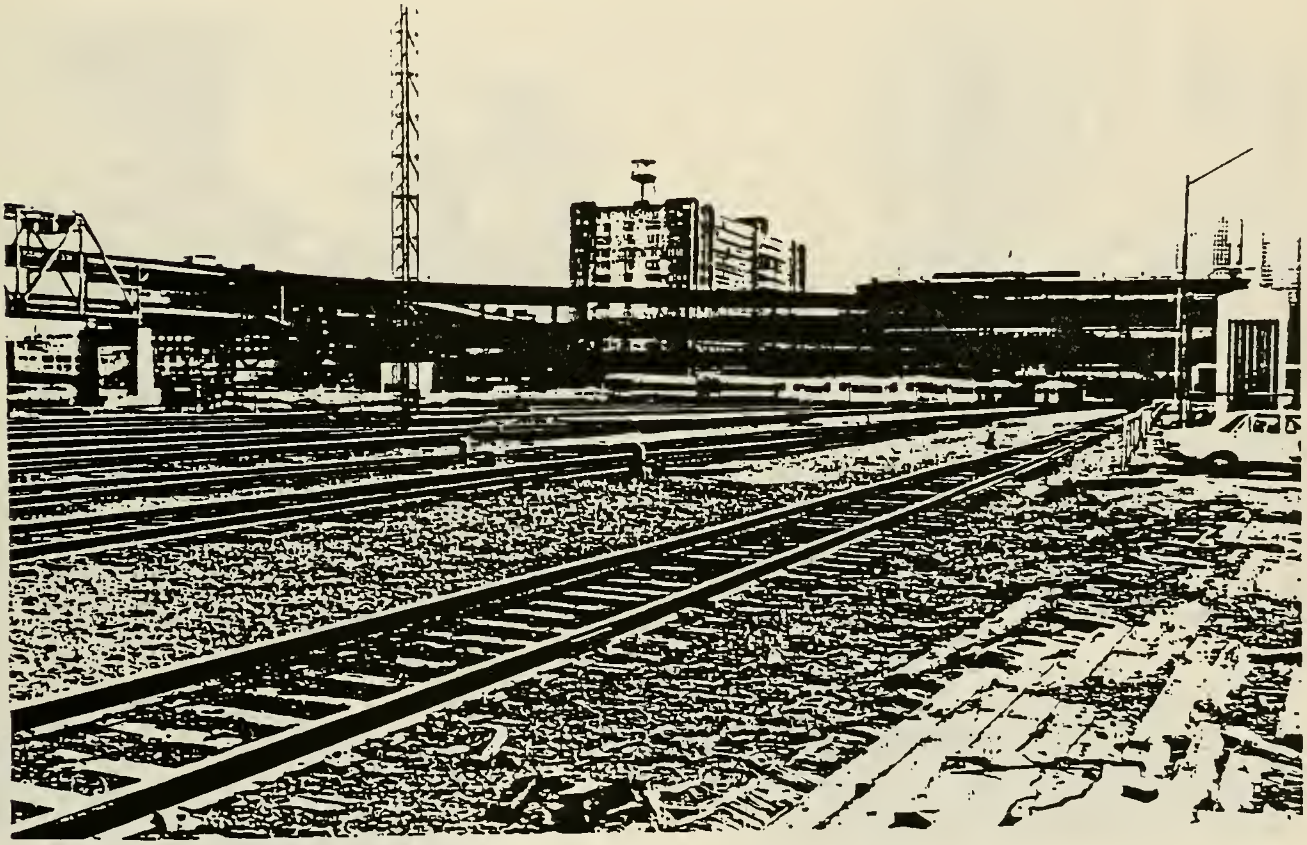


(b) Parking Lots along Nashua Street and Storrow Drive Connector Ramps

Figure V-26: NORTH STATION PROJECT AREA VIEWS

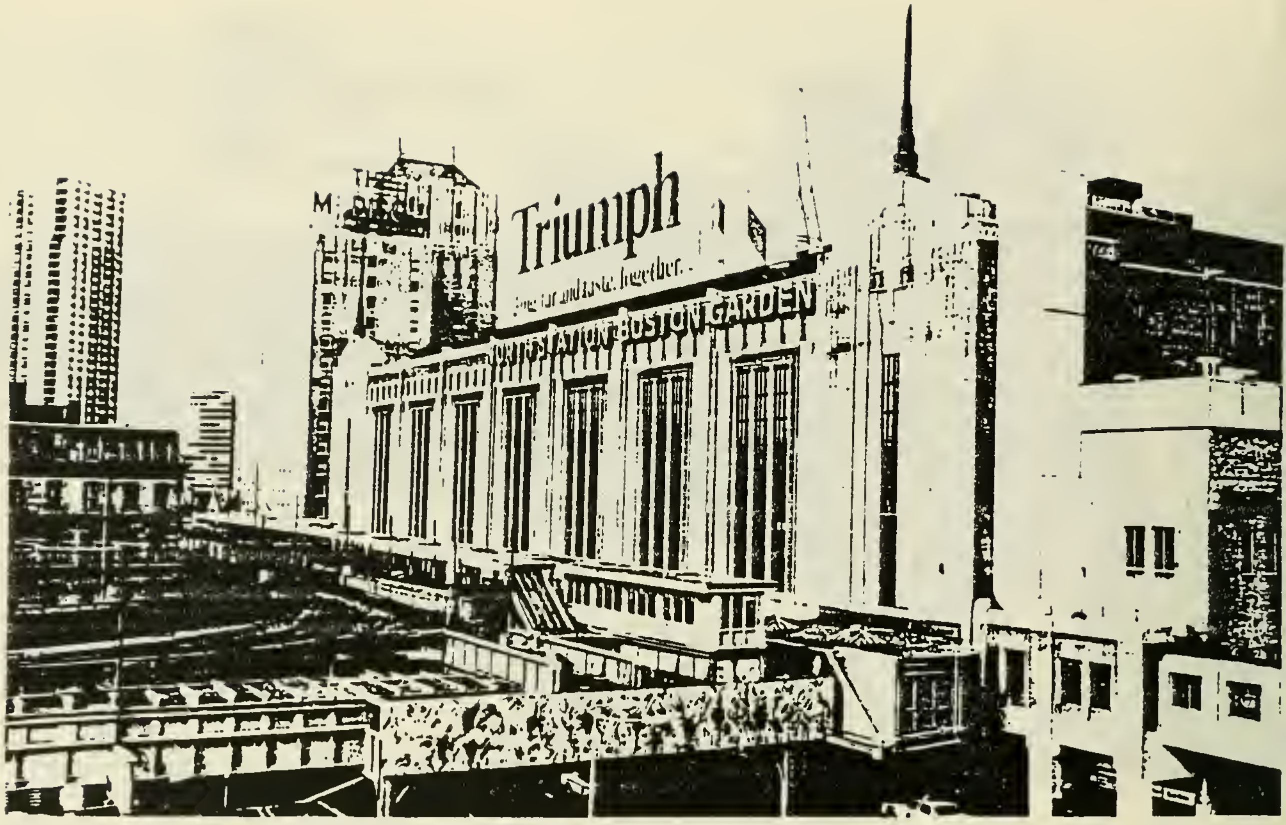


(a). Riverfront near Nashua Street

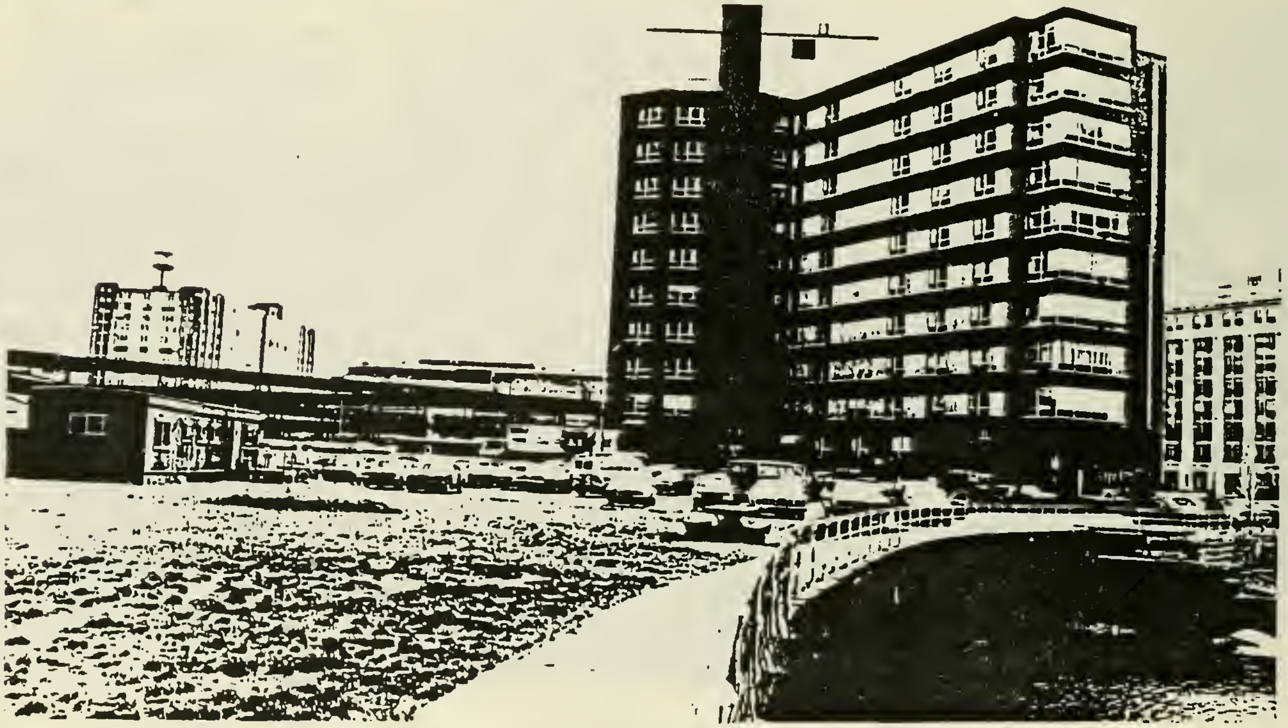


(b) B&M Railyards behind North Station

Figure V-27: NORTH STATION PROJECT AREA VIEWS

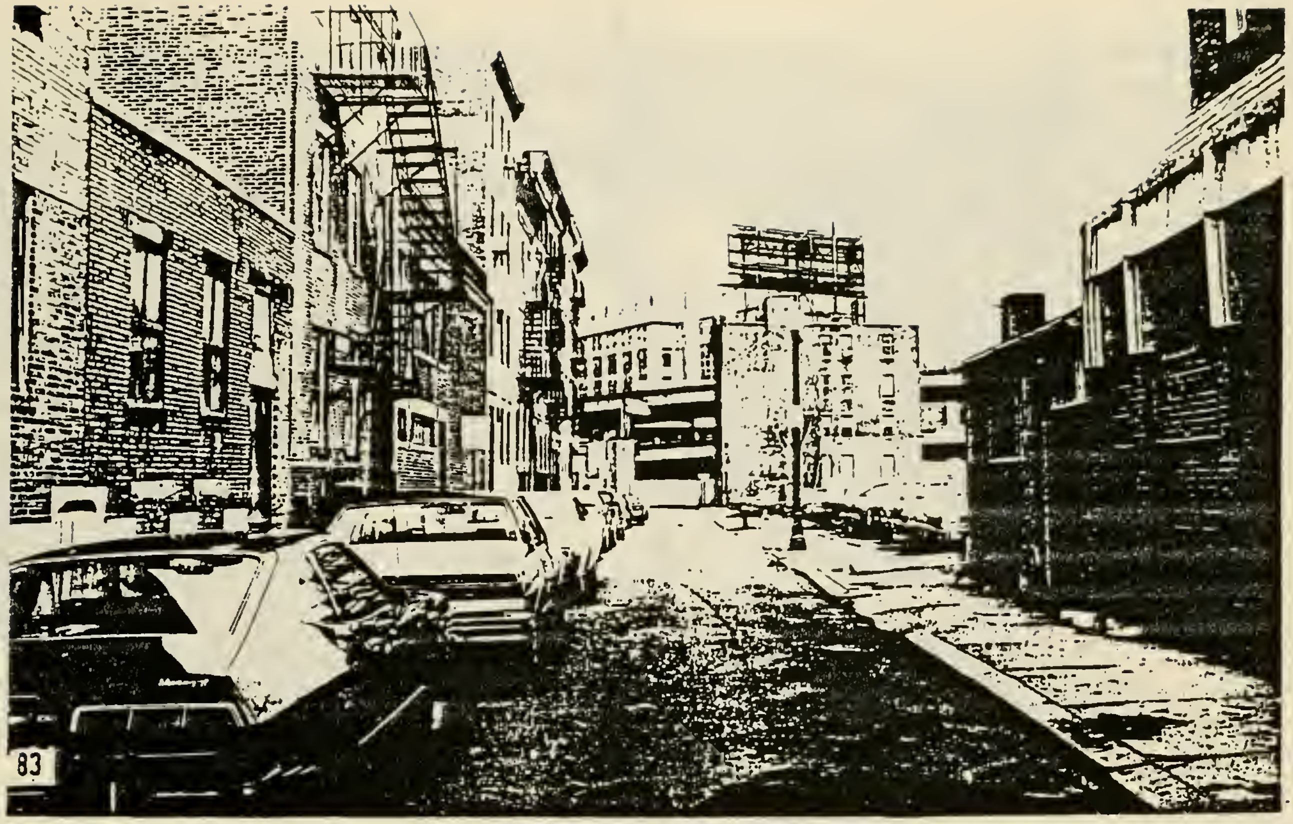


(a) North Station/Boston Garden Building

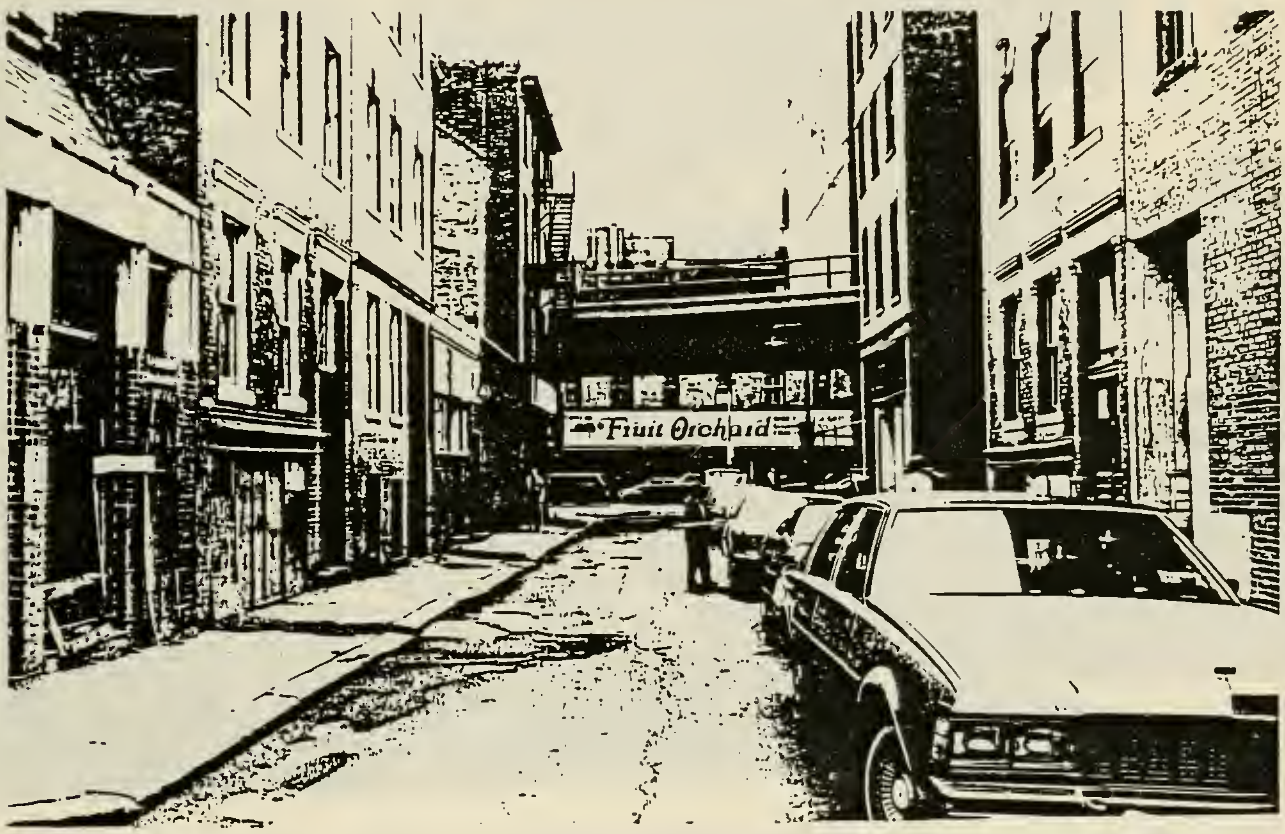


(b) Massachusetts Rehabilitation Hospital

Figure V-28: NORTH STATION PROJECT AREA VIEWS

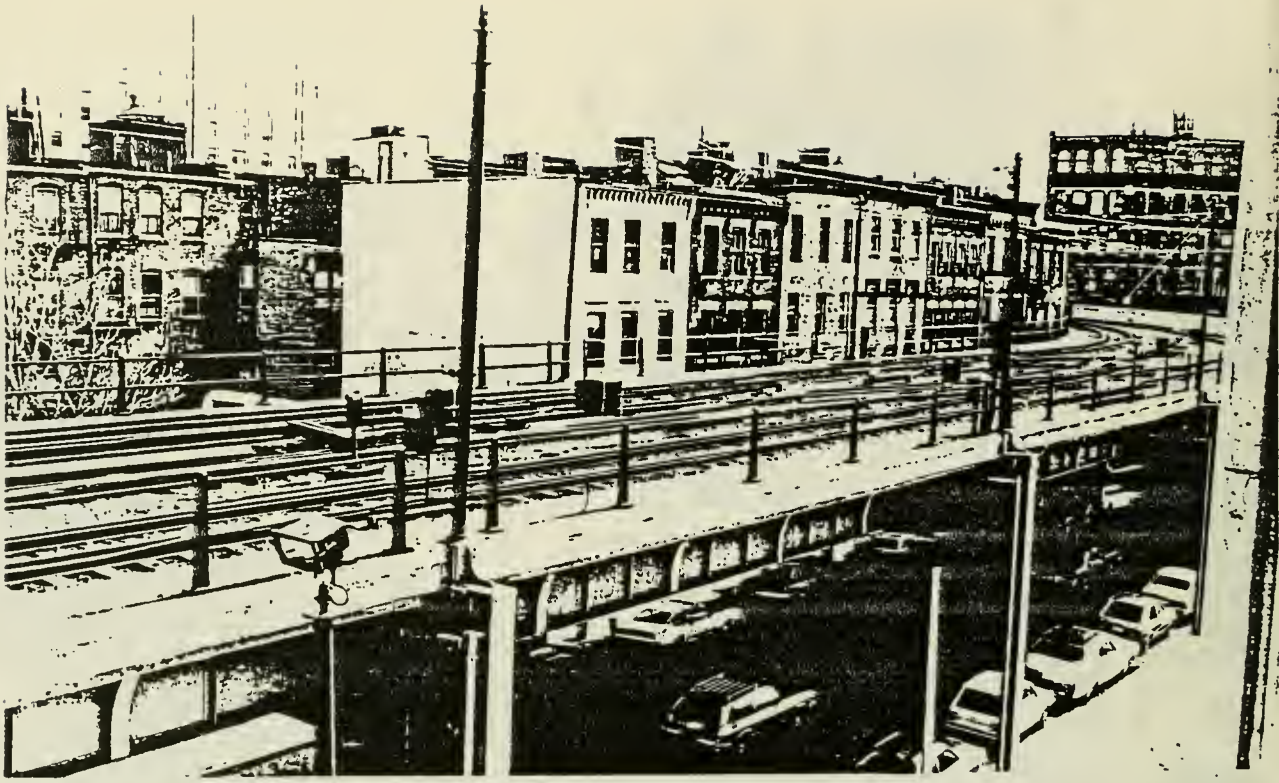


(a) Billerica Street (towards D.P.W. Building)

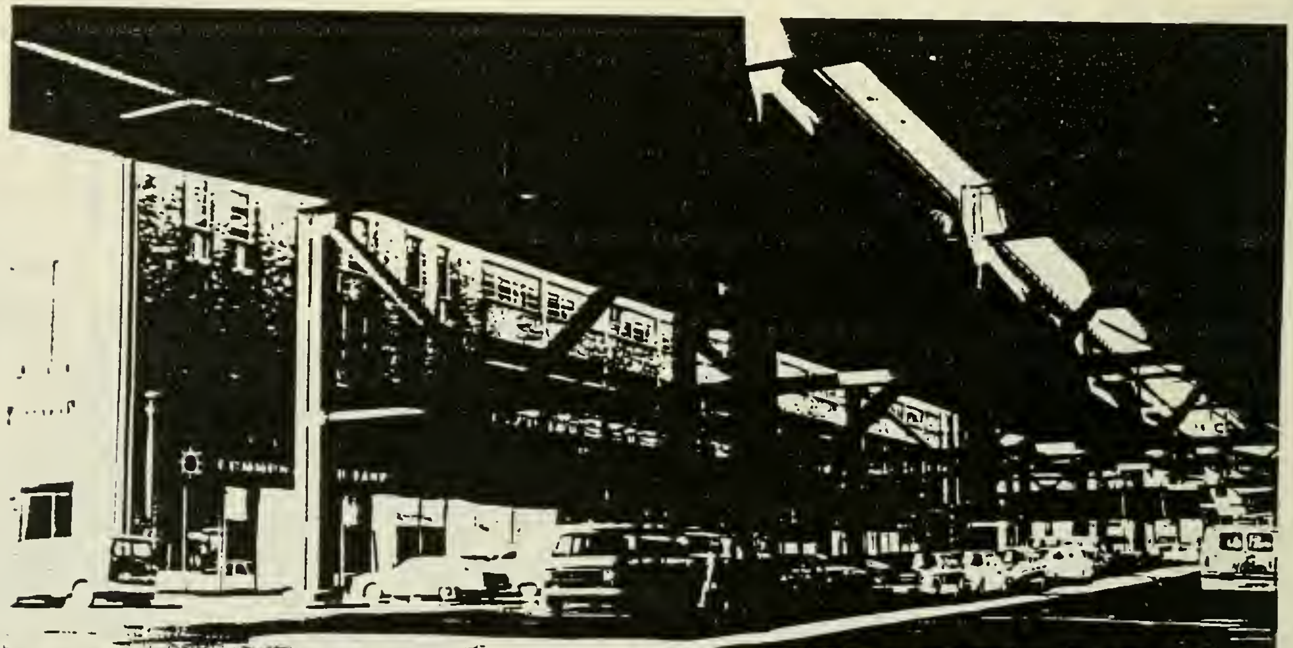


(b) Billerica Street (towards Causeway Street)

Figure V-29: NORTH STATION PROJECT AREA CHARACTERISTICS

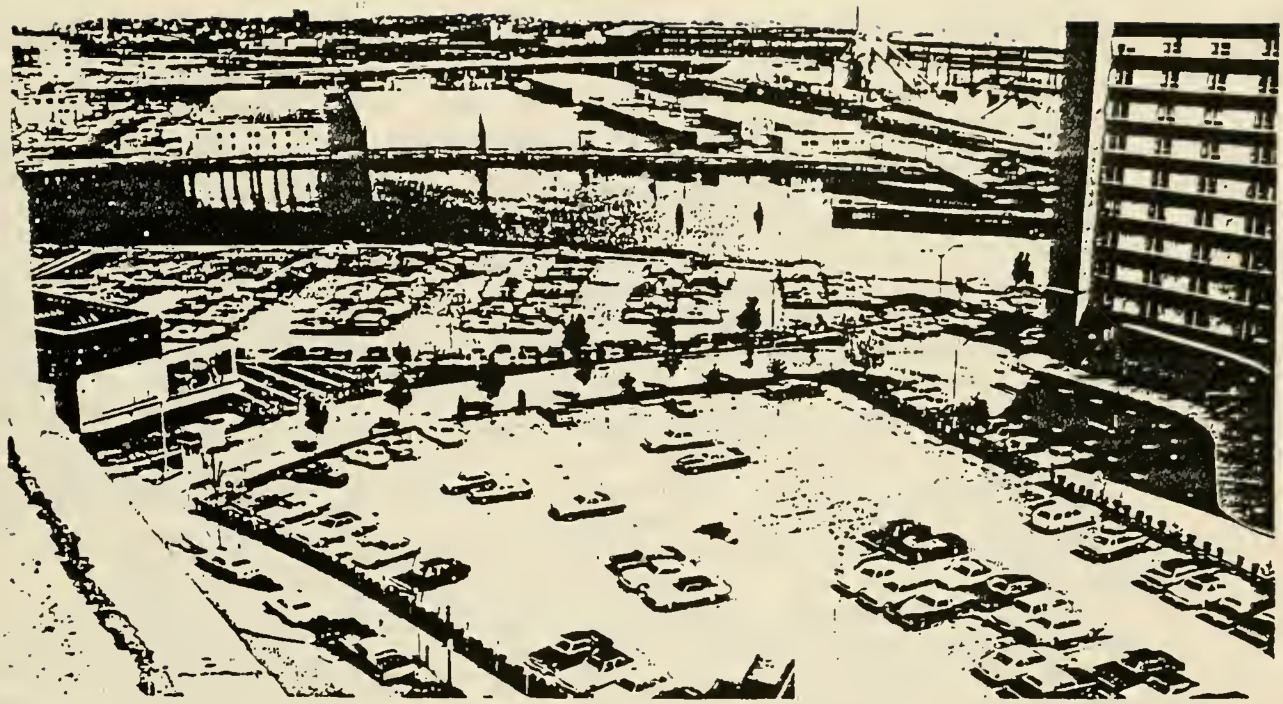


(a) Green Line Elevated above Lomasney Way

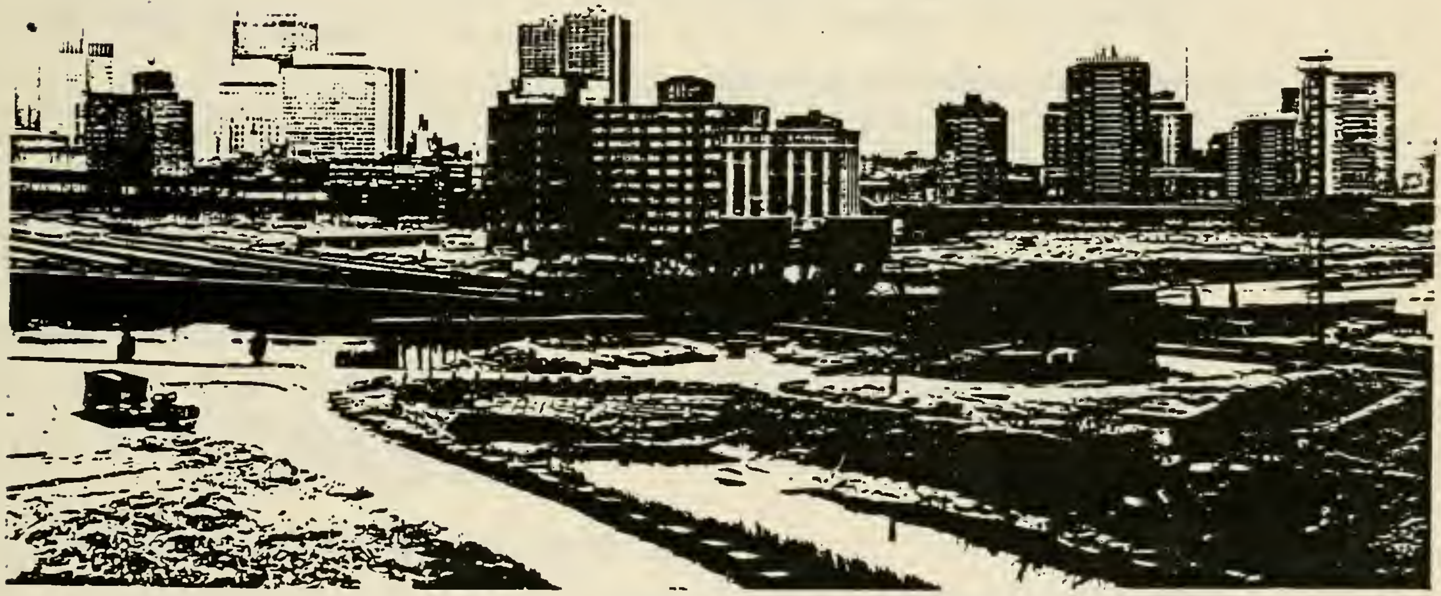


(b) Green Line Elevated above Causeway Street

Figure V-30: NORTH STATION PROJECT AREA CHARACTERISTICS



(a) View from D.P.W. Building towards Cambridge



(b) View of Project Area from Cambridge, towards Downtown Boston (left) and Charles River Park (right)

Figure V-31: NORTH STATION PROJECT AREA CHARACTERISTICS

The districts immediately surrounding the project area exhibit a variety of visual and aesthetic qualities. To the west and southwest are the relatively recent developments of the West End and Government Center urban renewal projects, characterized generally by large-scale, modern buildings in a relatively open, pedestrian-oriented environment. Adjacent to the North Station area, the West End consists of six 16- to 23-story apartment buildings (Charles River Park Apartments) designed by Victor Gruen Associates and constructed between 1961 and 1963, the 11-story Amy Lowell elderly housing, erected in 1974, two 37-story residential towers of the Longfellow Place complex also completed in 1974, and a 4-deck parking garage, all located in a landscaped setting. A vacant parcel at the corner of Lomasney Way and Staniford Street is reserved for future residential/commercial development. Across Staniford Street, in the Government Center Project Area, is the 5-story chipped-concrete State Service Center (Hurley Building and Lindemann Mental Health Center), occupying a 9-acre block. Designed by Paul Rudolph and completed in 1968, this complex originally was to include a 30-story tower.

The Bulfinch Triangle area to the south, once a thriving light manufacturing and warehouse district, has fallen into disrepair in recent years. The building stock has not been adequately maintained and several structures are marked by substantial deterioration. The area is characterized by underutilized buildings often housing marginal uses. On Portland, Lancaster, and Friend Streets, there are numerous vacant storefronts as well as unused floors above. The uses on the south side of Causeway Street are predominantly fast food restaurants, adult entertainment facilities, and taverns which service the day population of the area. As noted previously, the elevated Green Line structure is viewed as a significant blighting influence because it shadows most of the street and sidewalks on Causeway Street. In addition, both the rapid transit tracks and the Central Artery structure act as visual and physical barriers to the adjacent North End residential neighborhood.

Immediately east of the project area is the Analex Building, a 13-story office structure, the Stop & Shop bakery and 8-story brick warehouses along the river, and the new Charles River Dam. The north side of the river is relatively open and industrial in character, with large tracts of land occupied by the railroad and the elevated interchange of I-93/ Tobin Bridge, the storage yards and mixing plant of Boston Sand and Gravel Company, and modern one-story warehouse structures with truck parking areas. The aesthetic qualities of this area are, like the project area itself, largely negative.

References for Part V

B.2 Demographic Profile

(1) Demographic data have been obtained from surveys of the project area residents by the Boston Redevelopment Authority Relocation Department.

B.3 Transportation Facilities

(1) Data regarding vessel usage of the Charles River Basin were obtained from the Metropolitan District Commission (letter from Edward C. Anders, Manager, Locks and Drawbridges, Charles River Dam, October 31, 1983).

C.1. Geology and Topography

(1) Sub-soil information was obtained primarily from the Journal of the Boston Society of Civil Engineers, Vol. 56, No. 3-4, July-October 1969. Additional sources included: Goldberg, Zoino, and Associates, Inc., "Geotechnical Data Report, GSA Federal Office Building, Boston, Massachusetts" (draft letter to Hugh Stubbins and Associates, Inc., July 3, 1981, File No. G-2898.1) and Massachusetts Bay Transportation Authority, Green Line North Station Preferred Alternatives Report, prepared by Charles G. Hilgenhurst Associates, Inc., and Fay, Spofford and Thorndike, Inc., June, 1981.

(2) Water table data were obtained from the United States Geological Service, Ground-Water Levels on Boston Peninsula, Massachusetts, by John E. Cotton and David F. Delaney, Hydrologic Investigations Atlas HA-513, 1975, as well as from sources cited in (1) above.

C.3 Water Quality

(1) Federal Highway Administration/Massachusetts Department of Public Works,. Supplement to the Draft Environmental Impact Statement/Report - Third Harbor Tunnel, Interstate 90/Central Artery, Interstate 93, Boston, Massachusetts, Appendix 7 - Water Resources and Dredge Material Disposal, June 1983 (Table 37).

(2) Letter from Mr. Clayton Stokes, Assistant Superintendant, Locks and Drawbridges, Charles River Dam, August 20, 1981.

(3) Metcalf and Eddy, Inc., Draft Report on Combined Sewer Overflows Charles River Basin Facilities Planning Area, Volume II -Environmental Assessment Report, Boston, June 13, 1980, prepared for the Metropolitan District Commission.

C.4 Vegetation and Biological Resources

(1) Metcalf and Eddy, Inc., Draft Report on Combined Sewer Overflows Charles River Basin Facilities Planning Area, Volume II - Environmental Assessment Report, Boston, June 13, 1980, prepared for the Metropolitan District Commission.

(2) Metcalf and Eddy, Inc., op. cit., Vol. III - Appendices, Appendix G.1 "Biological Sampling Program".

D.1 Air Quality

(1) Discussion of the monitoring and modelling programs has been taken from Bolt Beranek and Newman, Inc., Air Quality and Noise Impact Analyses of the North Station Urban Renewal Project, Report No. 4477, (K.M. Chng *et al*.), prepared for the Boston Redevelopment Authority, Cambridge, June, 1982 (revised January, 1983 and September, 1983).

(2) Benesh, F., "Carbon Monoxide Hot Spot Guidelines, Vol. II: Rationale," U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Report No. EPA-450/3-78-023, Research Triangle Park, NC, August, 1978.

D.2 Noise Environment

(1) Central Transportation Planning Staff, Central Artery/I-93 Corridor - Central Area Planning Study, prepared for Massachusetts Department of Public Works, March, 1978.

(2) Bolt Beranek and Newman, Inc., Air Quality and Noise Impact Analyses of the North Station Urban Renewal Project, Report No. 4477, (K.M. Chng *et al*.), prepared for the Boston Redevelopment Authority, Cambridge, June, 1982 (revised January, 1983 and September, 1983).

Part VI PROBABLE IMPACT OF THE PROJECT AND ITS ALTERNATIVES AND MEASURES TO MINIMIZE ENVIRONMENTAL DAMAGE

Introduction

The sections of this Part VI describe in detail the anticipated environmental impacts, both positive and adverse, including those adverse impacts which cannot be avoided, of the proposed redevelopment of the North Station area and its alternatives, together with mitigation measures to avoid or minimize environmental damage. Also summarized in this Part are the potential environmental effects of alternative options for the rehabilitation or relocation of the Green Line elevated facility, of proposed improvements to the Leverett Circle/Central Artery connection, and of the Central Artery depression proposal within the North Station area. (For a full discussion of the impacts of the Central Artery depression, see Federal Highway Administration/Massachusetts Department of Public Works, Supplement to the Draft Environmental Impact Statement/Report - Third Harbor Tunnel, Interstate 90/Central Artery, Interstate 93, Boston, Massachusetts (FHWA-MA-EIS-82-02-DS), June 1983.)

Part VI PROBABLE IMPACT OF THE PROJECT AND ITS ALTERNATIVES AND MEASURES TO MINIMIZE ENVIRONMENTAL DAMAGE

A. Consistency with Policies and Plans

1. Federal and Massachusetts Urban Policies

The National Urban Policy, announced by former President Carter in March, 1978, emphasized the strengthening of local economies, the creation of new job opportunities, and the revitalization of urban centers. Joint development, involving a partnership of government agencies and the private sector working in concert, was to play a major role in achieving the goals of this new policy. Federal agencies adopted this policy into their programs. The Department of Housing and Urban Development (HUD), for example, already had the Urban Development Action Grant (UDAG) Program, authorized by the Housing and Community Development Act of 1977 (P.L. 95-128). The purpose of UDAG was to assist "distressed" cities and urban counties that needed increased public assistance and private investment to alleviate physical and economic deterioration, promote the revitalization of communities suffering population outmigration or a stagnating or declining tax base, and reclaim neighborhoods experiencing housing abandonment or deterioration. In furtherance of these objectives, HUD subsequently signed co-operative interagency agreements with the Department of Transportation and the Corps of Engineers to implement the President's urban policy commitments.

The Commonwealth of Massachusetts, through its Office of State Planning, also developed a comprehensive urban policy for the State in 1975,(1) which emphasized the focusing of economic development in urban centers. Like the Federal policy, the Massachusetts Growth Policy stressed the cooperation of government and private developers in joint development projects, making public services and facilities available as an attraction for private development. These policies were further developed through an extensive citizen planning process established by the "Massachusetts Growth and Development Act" (Chapter 807 of the Acts of 1975). Broadly, the objectives of the State policy (which, however, have never been legislatively adoped) include: 1) the channeling of growth into developed rather than outlying areas, 2) the stimulation of private investment to enhance the quality of life, 3) the promotion of the conservation and efficient use of natural resources, 4) the expansion of the availability of affordable housing opportunities, 5) the preservation of environmentally sensitive zones, and 6) state assistance and promotion of a balanced growth and development.

The proposed North Station area development is consistent with these Federal and State urban revitalization policies by virtue of its location in the urban center of Boston. Major new development is proposed in an area of the city that presently is underutilized and considerable new economic opportunities would be provided. The site is served by both regional highways and public transportation, including rapid transit and commuter rail, with significant potential for establishing an intermodal transportation connection supporting mixed-use development. The higher diversity and variety of land uses would create better employment opportunities and higher tax revenues than the uses which currently exist.

The housing component of the proposed development alternatives would increase the availability of mixed-income housing in the center city, and the site design and open space components of the project would help to create an environmentally attractive and liveable urban setting to replace an area which today has a strong negative image.

2. Massachusetts Coastal Zone Management Policies

The project area is adjacent to, but not located within, the boundaries of the Massachusetts Coastal Zone, as established in accordance with the Coastal Zone Management Act of 1972 (P.L. 92-583). Therefore, a Federal "Consistency Determination" pursuant to Section 307(c) of the Act is not required for the North Station development project. Notwithstanding, the Renewal Plan's proposals are consistent with two of the Coastal Zone Management Program policies relating to existing urban centers - Policy 27, which encourages the revitalization and enhancement of existing development centers in the coastal zone, and Policy 26, to ensure that State- and Federally-funded transportation projects serve existing development areas.

3. Local Plans and Policies

The North Station Urban Renewal Plan and development proposals are in conformity with the 1965/1975 General Plan for the City of Boston and the Regional Core,(2) as adopted by the Boston Redevelopment Authority in March, 1965. This Plan called for the establishment of a regional core sub-center at North Station, to include a variety of prime and supportive uses, improved traffic distribution and parking efficiency, and a better balance of night and day vitality. The North Station sub-center was designated primarily for commercial development - offices and supporting retail and service establishments - together with the construction of large parking facilities intergrated with public transportation to encourage greater development of the extreme ends of a Regional Core spinal development structure and greater use of rapid transit. The Plan also proposed the expansion of the Charles River frontage open space through the North Station area as well as a public/institutional use within the Phase II area. Only a housing component was not identified in the General Plan.

The Renewal Plan also conforms generally with the Downtown North General Neighborhood Renewal Plan (Mass R-45), approved by the BRA on April 2, 1964.(3) The GNRP proposals were based on plans developed for the area by I.M. Pei Associates in 1961, in concert with the North Station Merchants Association. Basically, the GNRP recommended, for the present North Station project area, the clearance of the Billerica Street blocks for commercial development, conservation of the Madison Hotel and Boston Garden/North Station building, with additional office and commercial development behind North Station, the removal of the Green Line elevated structure from Causeway Street (the Plan recommended, however, the discontinuance of this line at the present North Station surface loop), new off-street parking garages in a retail reuse site north of Causeway Street, and a public park strip along the riverfront to extend the Esplanade to the North End.*

In addition, the redevelopment plan is an outgrowth of three other, more recent, planning studies of the North Station project area and environs: 1) New Directions for North Station, (BRA, November 1977), 2) A Development Plan for North Station District (Moshe Safdie and Associates, Inc., (1979)), and 3) the North Station Commercial Area Revitalization District Plan (BRA, Application for Designation of the North Station CARD, August, 1980). The proposals of the renewal plan are consistent with these studies and conform to their objectives and recommendations.

New Directions, intended as a point of departure for continuing discussions with the Downtown North Association as well as a schematic proposal for the North Station/Bulfinch Triangle area, concluded that a major, large-scale revitalization effort, similar in scope to the adjacent renewal projects, was required to reverse the current pattern of stagnation and decline and to overcome the overall negative image of the physical environment. A staged renewal program, which included a major office development on the North Station site and complementing commercial uses in the Registry Building area, relocation of the MBTA Green Line to a tunnel under North Station, the widening of Lomasney Way/Merrimac Street, and landscaped open space along the riverfront, was recommended. The Safdie plan represents the basic concept which since has been formalized into the renewal plan proposals. The North Station CARD is primarily a program of public incentives for the economic and physical improvement of the Bulfinch Triangle area, but it included the Boston Garden building within its boundaries to facilitate an earlier-planned rehabilitation of the structure. Other project-related elements of the CARD plan include removal of the elevated structure and the Lomasney Way/Merrimac Street widening.

Finally, the redevelopment proposals also are consistent with the plans and policies of regional recreation and transportation agencies. The Metropolitan District Commission (MDC) has had a long-standing objective of expanding the Charles River Esplanade from Leverett Circle to the North End. The renewal plan's provision of landscaped parkland and promenades along the river and the proposed canal and the opening of the waterfront to public access conforms conceptually with this objective. Secondly, according to the MBTA, the system is committed to improving the quality and efficiency of its public transportation facilities and to enhance the attractiveness of this mode as an alternative to the automobile. At North Station, improved intermodal transfer capabilities between the Green and Orange Lines rapid transit service and the commuter rail service are seen as equally important in supporting the City's revitalization efforts. The intent of the proposed improvements is to provide modern transit facilities to serve existing transit users at North Station better and to accommodate anticipated increased future transit demands resulting from North Station and other major Northwest Corridor improvement projects. Both the BRA and the MBTA are working together closely to develop mutually acceptable proposals to assure the implementation of these objectives.

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* The I.M. Pei plan was based, in part, on an earlier plan for the North Station area prepared by Advance Planning Associates in 1960 (A Planning Study of the North Station Area, Boston, Massachusetts, prepared for the North Station Merchants Association, Cambridge, August, 1960), which also recommended the removal of the Causeway Street elevated structure ("a basic step in the improvement of the North Station area"), the clearance of the Billerica Street blocks and closure of Nashua Street to form a superblock between Lowell Street (the present Lomasney Way) and the Analex Building, the construction of new retail, commercial, and parking facilities, and the extension of parkland along the riverfront. More distant proposals included residential development in the rail yards area (in the event that commuter rail facilities ceased to be needed) as an extension of the Charles River Park residential complex.

B. Land Use and Development Impacts

1. Land Use Proposals

The land use proposals for the North Station project area - retail/commercial, office, hotel, residential, parking facilities, arena and commuter rail terminal, and open space - would continue both the prevalent downtown Boston mix of uses and the existing use of the project area, albeit, in some cases, in substantially different locations or in a much different form. Nearly all development proposals are for uses which have been located in the North Station area for several decades, or which at one time were present. In addition, the various uses have been arranged in such a way as to be mutually reinforcing and generally compatible with one another as well as with the adjacent urban fabric.

Within the Phase I area, the Boston Garden arena and the North Station commuter rail terminal would be reconstructed behind the present building containing these facilities, and office structures, including the new Federal Office Building, would replace the small mixed residential/commercial enclave along Billerica Street and the vacant Madison Hotel and the Boston Garden/North Station building. (Under the optional scheme for the North Station site development parcel, a hotel would be constructed, continuing the tradition of the former Madison Hotel connected with the railroad terminal.) These uses would complement the commercial character of the Bulfinch Triangle and other adjacent areas and the existing and proposed offices on Staniford Street in Charles River Park. The proposed site of the Federal Office Building, moreover, is opposite the State Welfare Building, thus reinforcing the public/government functions of the nearby Government Center area.

The Phase II area is more residentially related, with the 1,100 unit housing development proposed on a newly-created island and the hotel and related uses facing the proposed canal. Significantly more housing is proposed than currently exists in the project area, but its location would be better related to the Charles River Park residential complex, with which it would have a similar socio-economic character. The provision of the extensive residential use in the project area would ensure a 24-hour, seven-day per week active urban neighborhood, and the retail uses along the promenade and the museum and shopping facilities on the island should help promote an interaction between the residential and the daily worker populations. The extensive parking uses would continue, but in structures rather than on open lots. Service and parking activities would be below grade or within larger structures and would be separated from the housing and commercial activities and from the pedestrian circulation system.

Open spaces would be extensively landscaped and integrated as much as possible with the new structures to provide a complementing relationship with high density development. Most importantly, the waterfront, for the first time, would be open to public use and enjoyment by the provision of parkland and promenades along the edges of the river and proposed canal (see Figure VI.B-1). Construction of the canal itself would double the opportunity to provide water-edge walkways as well as bring the river closer to the downtown area.

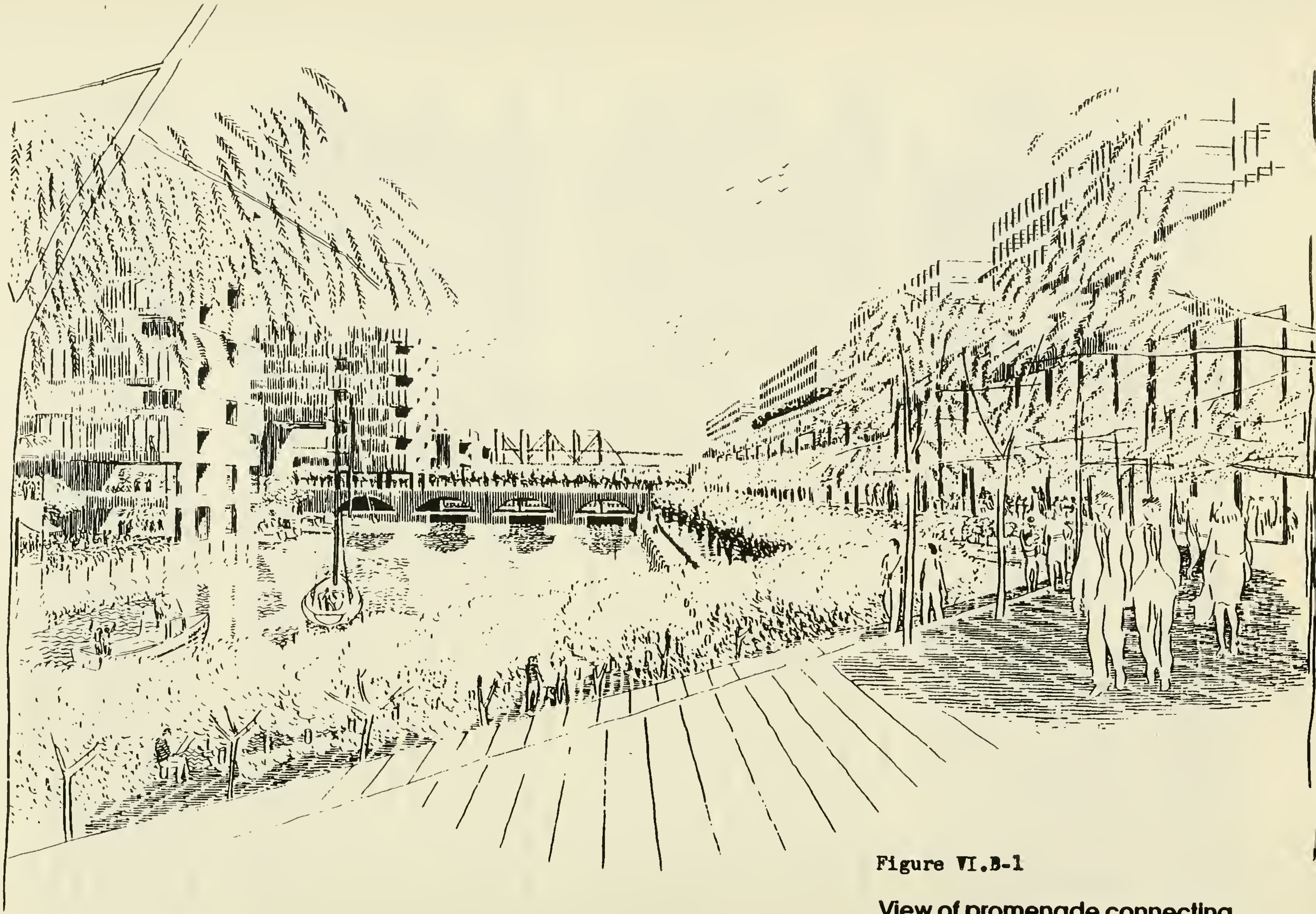

Figure VI.B-1

View of promenade connecting the Esplanade to the New Charles River Dam and Waterfront Park

In summary, the more active and noisy uses (such as the arena and office buildings) are located toward similar uses downtown, whereas the park and residentially-related uses have been situated along the riverfront and adjacent to the neighboring Charles River Park residential complex.

With respect to the roadway proposals, major traffic circulation would be designed for the periphery of the project area, with internal circulation being that solely related to the uses within. The retention of the Storrow Drive Connector ramps, however, could adversely affect the adjacent upper level hotel proposal unless specific measures are designed to eliminate air pollution and noise emissions from the heavy traffic on the ramp structure. With structures proposed on both sides of the ramps, the pollutants and noise would be trapped within the canyon created, which would exacerbate the adverse conditions and could make the hotel development extremely undesirable at this particular location.

At the same time, preliminary Massachusetts DPW proposals to relocate this connector could seriously affect many of the Authority's plans for the Phase II development of the project area. The least adverse impact would result from the proposed tunnel alternative (DPW Alternative 2). The tunnel section at Leverett Circle would conflict with the proposed canal construction by necessitating a reduction in depth of the channel, thereby limiting its accessibility for rivercraft. This alternative also could hinder building construction near the new Charles River Dam, where the tunnel section would rise to join the Central Artery elevated section. Otherwise, the tunnel would be underneath the proposed island development.

All of the bridge alternatives would conflict with the proposed island/canal construction and would make such development infeasible. Each of the three schemes would locate highway ramps and elevated sections in the western and northern sections of the proposed island, greatly reducing its development potential as well as the economic feasibility of any island development. In addition, the complex of ramps and bridges would seriously degrade the aesthetic environment while producing significant noise and air pollution impacts on any development located nearby. These schemes also would impede any canal construction, since either tunnel portals would be located within the canal alignment or the height of the ramps would not permit the passage of boats on the canal.

Similarly, the Central Artery depression proposal also would prevent implementation of the BRA's long-range development plan for Sub-area II and would reduce the size and threaten the viability of any development proposal for the area. One of the major features of the North Station project is the proximity to the Charles River and the beginning of the Inner Harbor. It is strategically located for linking the harbor waterfront with the Charles River Esplanade. The current BRA (Safdie) plan maximizes the interface between water and land uses by means of a canal which brings water into the interior of the project area and creates an island. The proposed Storrow Drive connector tunnels directly conflict with this canal and island concept and, in fact, would probably eliminate any canal configuration if this waterway is to be anything more than a shallow reflecting pool. Tunnel and ramp locations also would negatively affect or prevent much of the proposed development, particularly the construction of a public building/museum on the eastern end of the island

and further would eliminate any service access to the proposed arena. The incompatibility of these two proposals points to the necessity of a serious reexamination of future development for the area should the Central Artery depression scheme be carried forward.

Under the reduced-scale development proposal, land use impacts in the Phase I area would be the same as in the preferred program. In the Phase II area, residential and office development would replace the hotel proposal, but the potential air pollution and noise impact problems would remain the same, making this location particularly undesirable for residential use. In addition, housing located here would be more isolated from the Charles River Park development. With this alternative, the office use of the Registry/DPW Building and the existing hospital facility would continue as at present, but nearly all the open parking areas would be replaced by landscaped parkland, extending the qualities of the Esplanade to the new Charles River Dam. As in the preferred plan, the riverfront would become accessible to the public. While a larger residential population than presently exists would live in the project area, the number of units proposed would be considerably less under this option, reducing the potential for the development of a viable residential neighborhood.

With the no-build alternative, the land uses would remain essentially the same as at present, with the possibility of the growth of surface parking lots as further building demolitions might be expected to occur in the Billerica Street blocks area. No new development would be reasonably foreseen in the near-term future; the Green Line elevated would continue to be a deterrent to revitalization efforts, and heavy traffic would continue to divide the area. Furthermore, the riverfront would remain inaccessible to the public and would not fulfill its potential as a significant urban open space resource. The land left underutilized would not contribute toward achieving the City's development, economic, or environmental goals for the immediate project area.

2. Zoning

The present zoning in the project area does not allow for the density of development nor for all of the uses proposed in the Renewal Plan (residential uses, for example, are forbidden by the Boston Zoning Code in an industrial zone district, which comprises the entire area north of the Boston Garden Building and east of Nashua Street). Accordingly, the Renewal Plan proposes certain zoning district and floor area ratio changes, including designating major portions of the project area as "urban renewal area districts",* for which the Urban Renewal Plan establishes certain use and dimensional controls (see Fig. VI.B-2). These zoning changes would permit the proposed alternative developments to conform to the Zoning Code without requiring a variance.

No zoning changes would be required with the no-build alternative.

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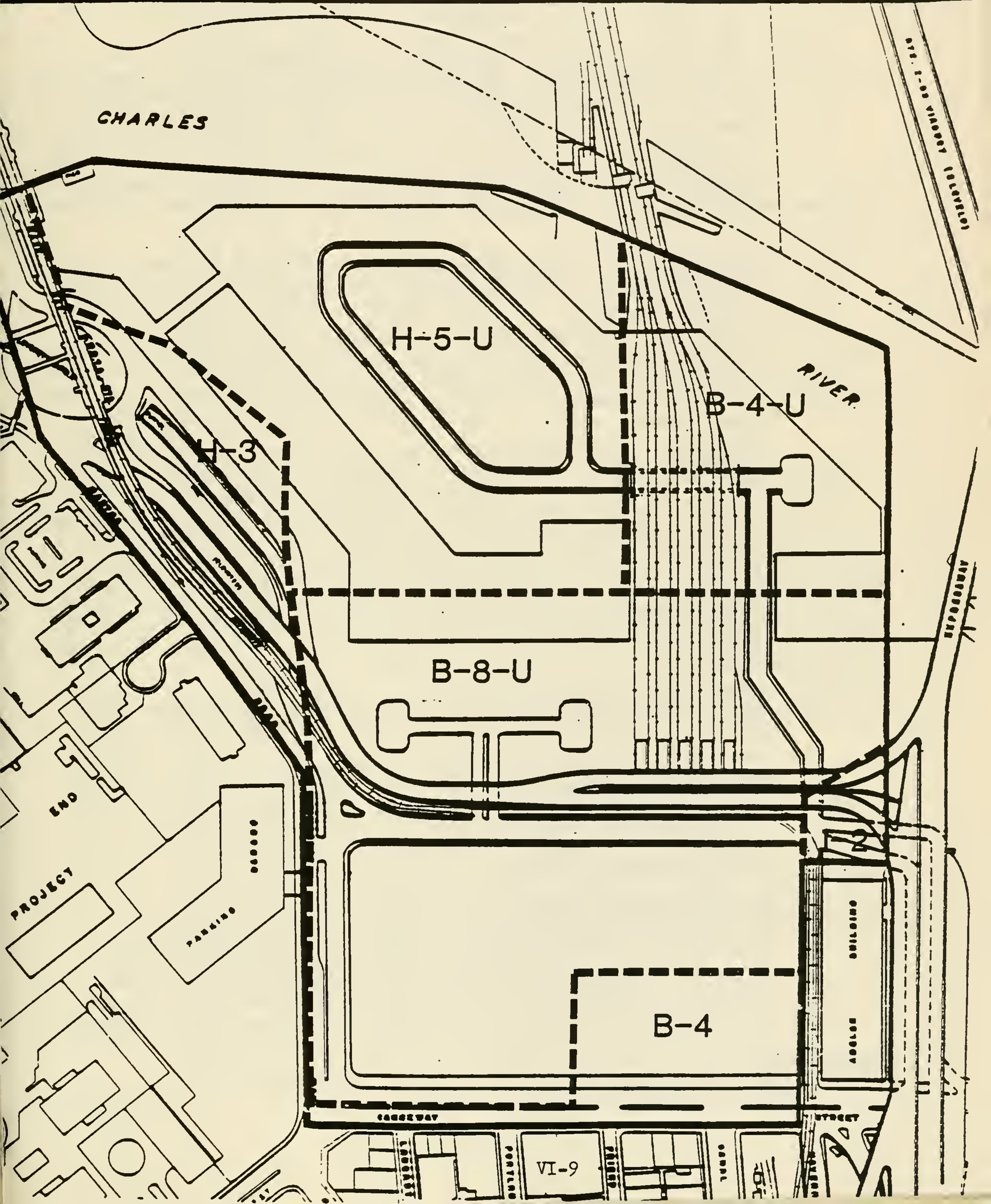
* Section 3-1A of the Boston Zoning Code and Enabling Act, as amended.

NORTH STATION REDEVELOPMENT PROJECT

BOSTON REDEVELOPMENT AUTHORITY

PROPOSED ZONING

Figure VI.B-2



3. Park and Recreation Uses

3.1 Riverfront Park Expansion and Public Access

The usable waterfront open space in downtown Boston is concentrated along the Esplanade in the Back Bay/Beacon Hill areas, the North End Park along Commercial Street, and the Waterfront Park near Long Wharf. The North Station area, with its vast parking lots and rail yards, breaks the Charles River open space system in half, with the Esplanade currently ending near the Museum of Science and the North End Park/MDC recreation area beginning some three blocks east of the project area. Recently, the MDC expanded this park area along the shoreline to the Charlestown Bridge.

As part of Phase II of the project it is proposed to create a water channel and a new island and to extend the Esplanade Park system as a linear open space beyond the Museum of Science along the southern edge of the canal. This open space would take the form of a two-level, tree-lined promenade, of a minimum width of 50 feet, fronting the hotel and retail stores opposite the island (Figure VI.B-1) and a landscaped park area between Lomasney Way and the new canal. The canal-front promenade would link both to the major north-south pedestrianway connecting the island to Sub-area I and to the Canal Street Mall to Haymarket Square and to the new Charles River Dam, permitting pedestrian access to Charlestown across the dam. The size of the island would permit open space and public access to co-exist on both sides of the channel. The embankment on the inland edge of the canal also would be landscaped open space accessible to the public. Paths for both pedestrians and cyclists would be provided. In addition, small pleasure boats would have access to the new channel and mooring or docking at the island. As a result of these project activities this portion of the Basin, for the first time, would be opened up to the public as expanded park and recreational space.

The optional development program would expand the open space available to the public from 7.3 acres in the preferred plan to 10.2 acres. Like the preferred program, a canal but a smaller island would be created and the channel edge on both sides would be developed as a landscaped park area and promenade. Larger park areas would be available on both the island and in the extension of the Esplanade beyond Leverett Circle, which could provide for the development of a more active recreation facilities such as ball fields and tennis courts.

Both development options are in keeping with the long-standing recommendations of the MDC and the Metropolitan Area Planning Council (MAPC) to expand public access to the riverfront and to landscape the edge of the Basin between the two dams as an urban park,(1) although the reduced-scale program would create a larger park area and thus better fulfill these objectives.* The recommendations also proposed a marina for the mooring and launching of boats in the protected area between the dams; this activity would be accommodated at the proposed island (and could be provided along the inland shore as well). Because the commuter rail tracks would continue to exist, however, neither option would permit a ground level continuation of the parkland along the entire shoreline, but both alternatives do provide for an air-rights pedestrian platform spanning the tracks, thus continuing pedestrian access and the promenade between Leverett Circle and the new Charles River Dam.

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* Most recent MDC plans for extension of the Esplanade in the North Station area are described in Section 3.2 _infra_.

All four bridge and tunnel alternatives for the Central Artery/ Leverett Circle Connector replacement, however, would adversely impact the opportunity to expand the Esplanade park system between the two dams and to provide public access to the riverfront, since ramps or tunnel construction would occur along the river's edge. For the three bridge schemes under study, this construction would occur in the area between the old dam and the MBTA commuter rail bridge. Under the tunnel option, which is the preferred DPW proposal, ramp construction would take place between the railroad bridge and the new dam and would require the taking of a portion of the MDC landscaped park area on the southern side of the new dam. However, the surface area between the old dam and the railroad would not be affected by any roadways.

Construction of the Storrow Drive connector tunnels and new low-level bridges, proposed as part of the Central Artery depression scheme in the North Station area, would require some realignment of the existing pedestrian paths at the MDC park by the new Dam but would not totally prevent a future continuation of the parkland along the present riverfront on air-rights over the tunnel sections, although new surface roadways and ramps on the Leverett Circle area would present a barrier to implementation of park extension there. Moreover, the shadow effect of the low-level bridges and the closer proximity of the walkways and park area to the bridge structures and its traffic would reduce their aesthetic qualities and their public recreational value. The low-level bridges also would destroy the potential attractiveness of the water environment in the vicinity of the new Dam.

Neither of the Green Line replacement options would impact any existing parkland or the potential to expand park and recreational areas along the riverfront.

Under the no-action option, the riverfront would remain in its current unkempt state and would continue to be inaccessible to the public (or could be privately developed at some future date), impeding the opportunity to develop this underutilized resource as urban parkland for public use and enjoyment.

3.2 MDC Proposals for the North Station Area

The Metropolitan District Commission's proposed plans for the extension of the Charles River open space system from the old Charles River Dam to the new Charles River Dam in the North Station project area call for the planting of trees and grass in the existing parking areas along Nashua Street between the Massachusetts Rehabilitation Hospital and Leverett Circle, as depicted in Figure VI.B-3. The plans include a new pedestrian connection from Nashua Street to the extended walk at the old dam, and a small lagoon and island reflecting the Esplanade lagoon. A small boat landing would be constructed from the island. Trees also would be planted along Nashua Street from the old dam to North Station. An at-grade pedestrian and bicycle pathway with signalized lighting would be constructed across the commuter rail tracks. This path is intended to define a connection between the segments of the Basin that are bisected by the railway tracks. Trees and grass likewise would be planted along the Basin between the tracks and the new Charles River Dam, and landscaping would be planted around the existing MDC parking site at the dam. A boardwalk along the water has been proposed from this parking area and under the Charlestown Bridge to connect to the MDC park area in the North End.

With this proposal, it is the intent of the MDC to provide a continuous pedestrian and bicycle path along the River to the North End park. The emphasis is on widening the green space along the River and maintaining the River's identity as an open space area. The total area involved is approximately 5.9 acres, only slightly larger than the 5.5 acres of open space along the Canal in the BRA preferred plan (and some 2.5 acres less than under the BRA optional plan). The major differences between the BRA proposal and that of the MDC (other than the island/canal concept) are that the BRA plan provides for a two-level landscaped, hard-surface promenade between the canal and the proposed structures along the Storrow Drive Connector ramps (rather than paths within grassed areas and boardwalks) and a complete separation of pedestrian circulation from the street system and the commuter rail tracks via overpasses, allowing an uninterrupted flow of pedestrian traffic at the edge of the project area. The MDC plan, on the other hand, proposes a dangerous at-grade crossing of the busy commuter tracks, a proposal which most likely could not be implemented for safety reasons. Moreover, the proposed landscaping of the .37 acre parking lot between Nashua Street and the expressway ramp tunnel at Leverett Circle probably would have little park value (other than aesthetic) and limited, if any, usefulness for recreational purposes because of its separation from the main park area by heavily-travelled Nashua Street.

4. Commercial/Pleasure Boat River Usage

It is not anticipated that the proposed North Station project would affect the number of boats using this segment of the Charles Basin. On the other hand, if a marina or docking facilities are provided within the project, some increase in the number of boats could be anticipated.

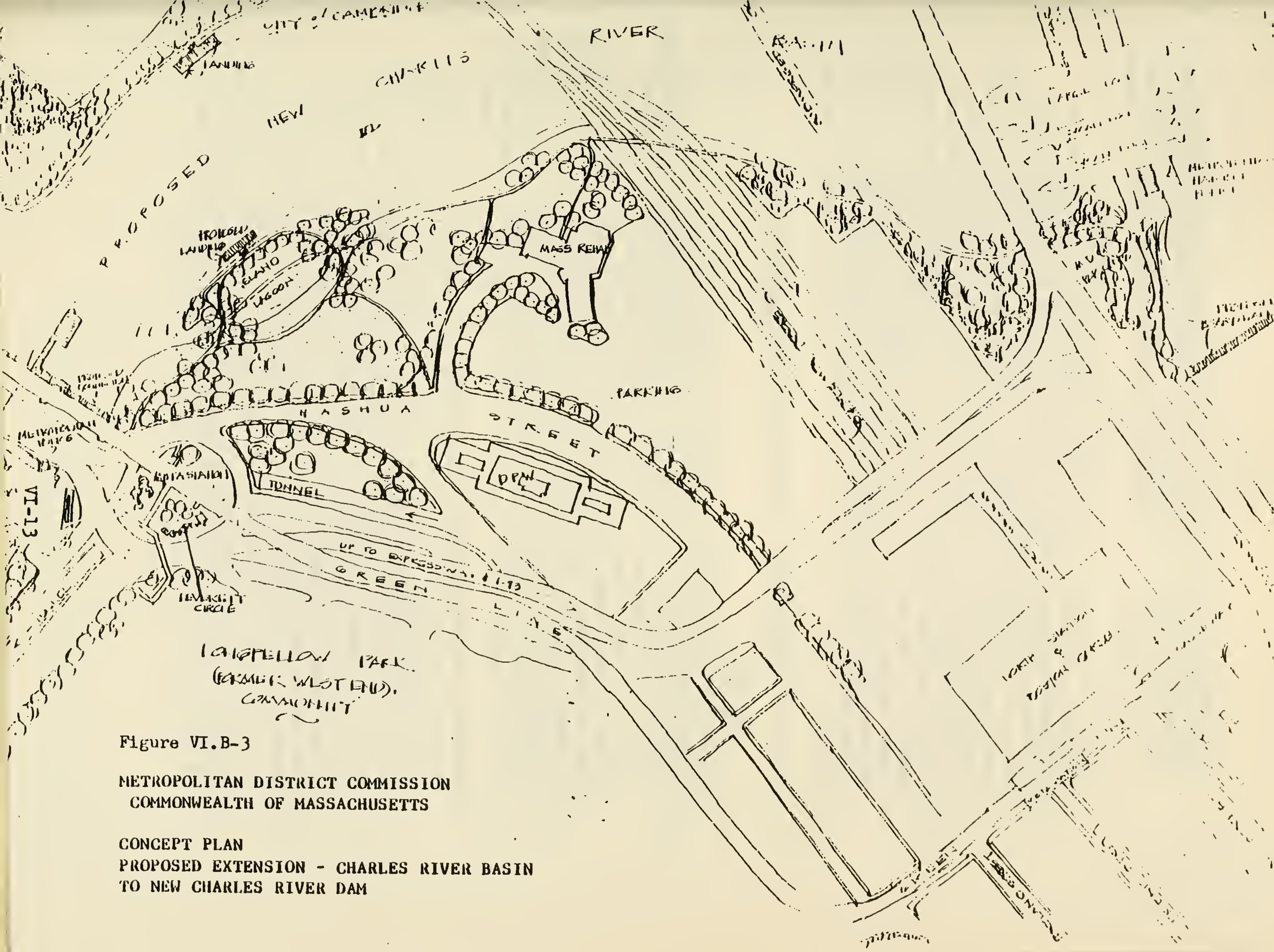


Figure VI.B-3

METROPOLITAN DISTRICT COMMISSION
COMMONWEALTH OF MASSACHUSETTS

CONCEPT PLAN
PROPOSED EXTENSION - CHARLES RIVER BASIN
TO NEW CHARLES RIVER DAM

The extent and location of filling for the island proposed under Phase II (both options) will take into consideration the need for an adequate navigational channel, particularly for large barges, and the development will be designed and engineered so as not to interfere with boat passage or safe turning radii.

Each of the bridge options for the proposed Central Artery/Leverett Circle Connector replacement, however, could limit or obstruct the navigation channel available for watercraft due to the placement of columns and supports for the bridge structures. The tunnel option could have serious short-term impacts during the construction period, since cofferdams, blocking up to half the river basin at a time, would be required for the cut-and-cover construction of the tunnels. Neither the depressed tunnels linking Leverett Circle to a depressed Central Artery nor the low-level bridges over the Charles, which would have a minimum vertical clearance of 30 feet, would be expected to seriously affect boat travel on the river, although additional bridge-supports would be constructed within the river (but outside the navigational channel to the locks). None of the Green Line replacement alternatives would have any impact.

The no-build alternative would maintain existing conditions.

5. Heliport

Located on the DPW parking lot opposite the Registry Building, adjacent to the Charles River, is a heliport, owned and operated by the Massachusetts Aeronautics Commission. This heliport is the only one in the downtown Boston area and not only is invaluable during emergency situations but also is frequently used by many State and private agencies and corporations in the course of their everyday business. Its proximity to area hospitals gives it particular importance in the transport of persons from a distance in urgent need of medical attention. It has also been used as an emergency operations center in support of public events (such as the visits of the Pope and Queen Elizabeth II) and was the only available air transportation facility in eastern Massachusetts following the February 1978 blizzard.

Implementation of the Phase II development as presently proposed would require the relocation of this heliport, its site being in the alignment of the proposed canal. The necessity of maintaining the heliport, either within the project area or at an alternative site in downtown Boston is clearly recognized. Potential locations within the project area ultimately would depend on the final plans developed for the Phase II area but could include a site near its present locale (although this would adversely affect the proposed extension of the Esplanade park system along the riverfront) or a rooftop location, such as the Lomasney Way parking structure. In its process of planning for and selecting a new site, the BRA will consult with the Massachusetts Aeronautics Commission and other concerned State agencies. The environmental impacts of any alternative site selected will be addressed in the Phase II Supplemental EIR/EIS.

C. Transportation Facilities

1. Traffic and Vehicular Circulation

1.1 Street and Highway Network

Under the proposed North Station Urban Renewal Plan nearly all of the existing streets within the project area, with the exception of the peripheral roadways, will be discontinued in order to provide viable development parcels for future construction. In particular, Nashua Street, which today functions as a major connector between Leverett Circle and streets leading to the Government Center area and the Downtown, will be closed between Causeway Street and Cotting Street during Phase I (to make an acceptable site available to the GSA for the proposed Federal Office Building) and will be replaced by a temporary detour around the GSA site via Causeway Street and Lomasney Way and a widened Cotting Street back to the retained portion of Nashua Street (see Figure VI.C-1). The remainder of Nashua Street would be discontinued during Phase II of the project.

The principal roadway improvements proposed in the Renewal Plan are shown on Figure VI.C-2 and include the following:.

1. The widening of Merrimac Street/Lomasney Way as a new two-way arterial along the western boundary of the project area to carry through-traffic between Leverett Circle and the Haymarket / Government Center area. This arterial also provides the principal access route to the project area.

2. The construction of internal access roadways to connect all major elements of the project and to provide access to the proposed Island. These roadways include a new access road in Sub-area I from Lomasney Way to a reconstructed Beverly Street and a closed loop road on the island with access from the new Phase I road.

3. The reconstruction of Accolon Way to serve as a service access drive.

4. The construction of local access streets to serve the Island residential development, the office/commercial facilities, and the parking structures.

5. The reconstruction and partial widening of Causeway Street, once the elevated structure is removed, to provide uniform roadway and sidewalk widths. Improvements also would include street trees, lights, and pedestrian amenities.

6. The redesign of the Lomasney Way/Merrimac Street/Causeway Street/Staniford Street intersection (Lowell Square) to accommodate the redirection of project area through-traffic.

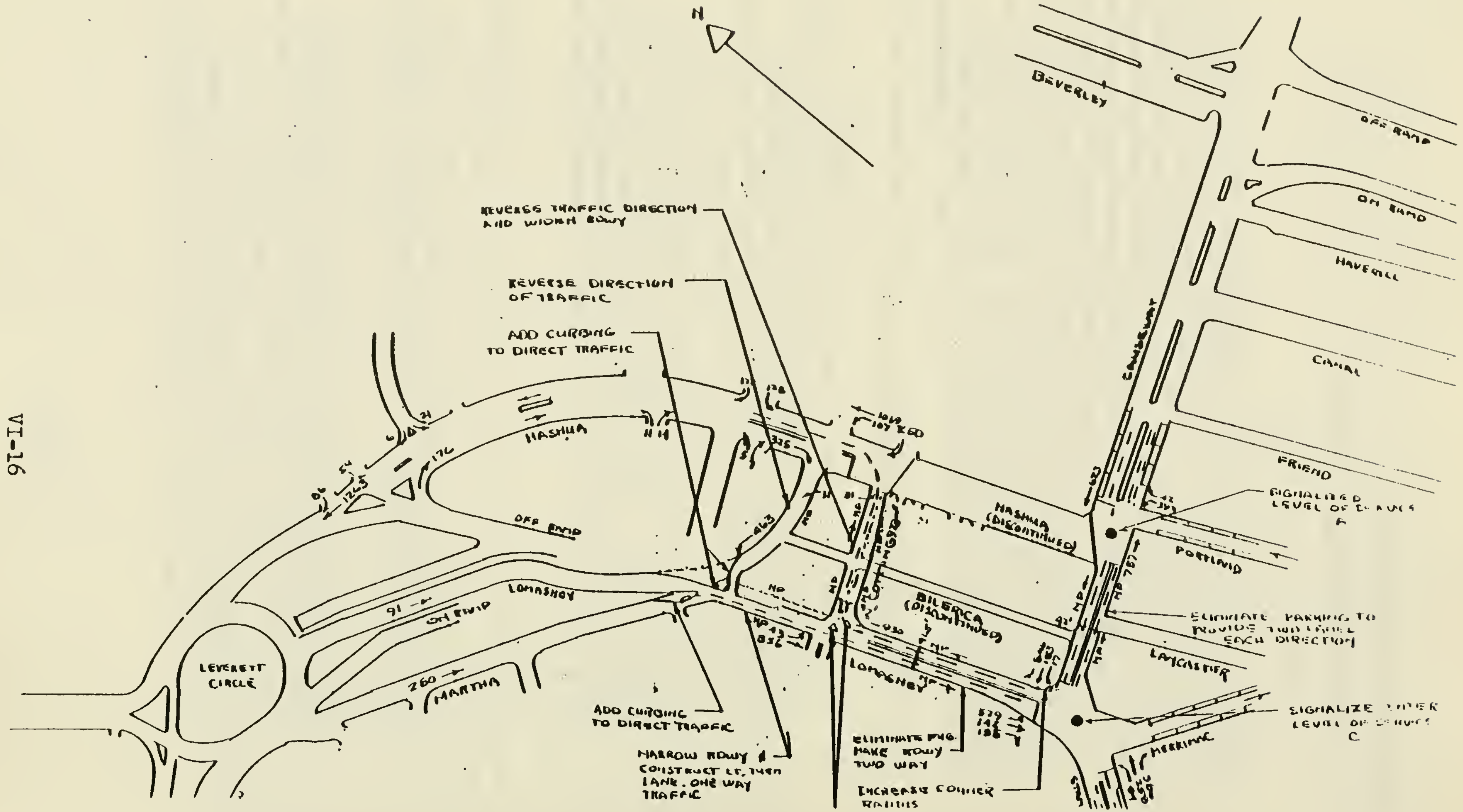
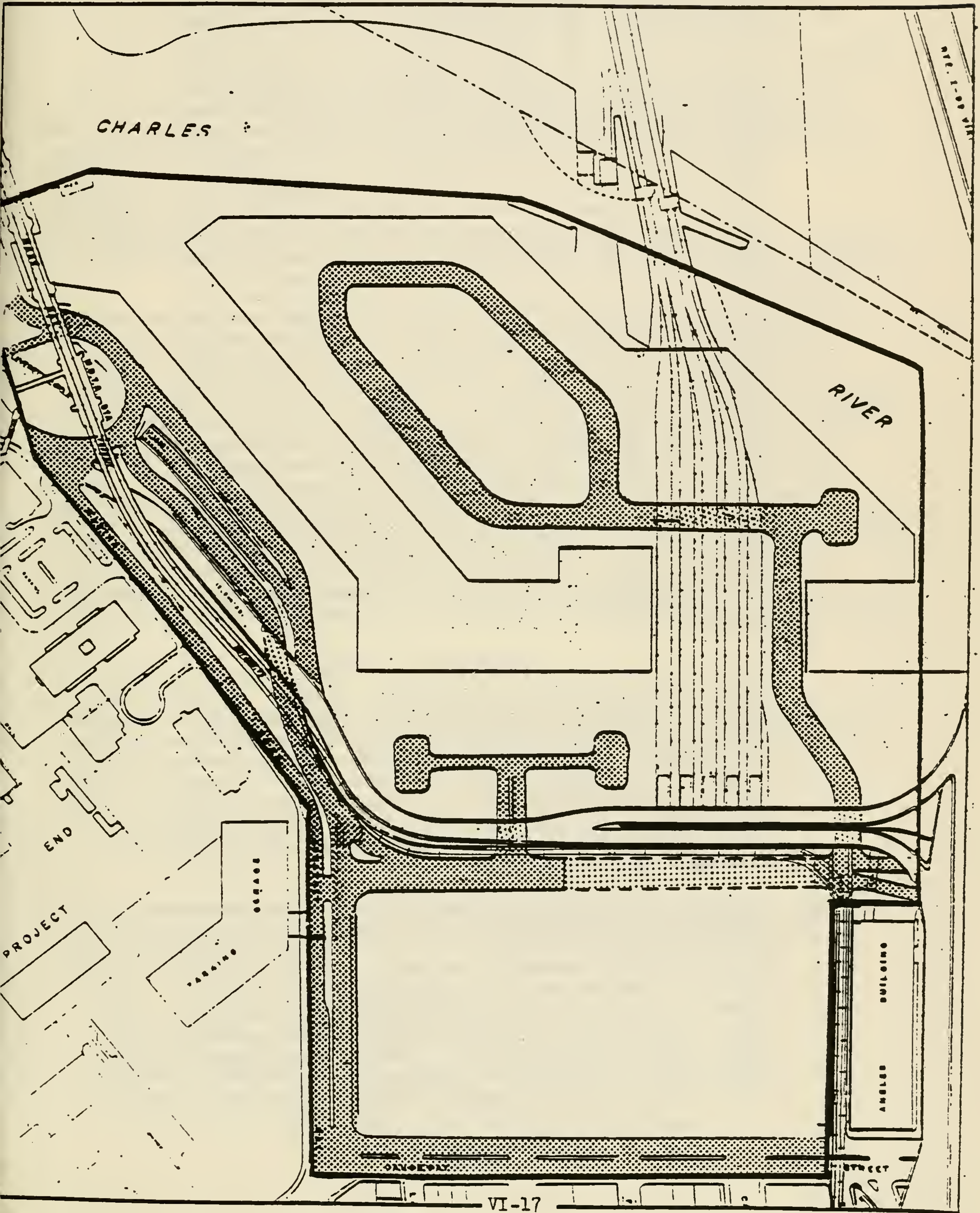

N
BEVERLEY
OFF RAMP
ON RAMP
HAVERILL
CANAL
CAUSEWAY
FRIEND
SIGNALIZED LEVEL OF SERVICE A
PORTLAND
NASHUA (DISCONTINUED)
BILERICA (DISCONTINUED)
ELIMINATE PARKING TO PROVIDE TWO LANES EACH DIRECTION
LANCASTER
SIGNALIZE UPPER LEVEL OF SERVICE C
MERRIMAC
REVERSE TRAFFIC DIRECTION AND WIDEN RDWY
REVERSE DIRECTION OF TRAFFIC
ADD CURBING TO DIRECT TRAFFIC
NASHUA
OFF RAMP
LOMASNEY
ON RAMP
91
260
MARTHA
LEVERETT CIRCLE
ADD CURBING TO DIRECT TRAFFIC
NARROW RDWY CONSTRUCT LT. TURN LANE. ONE WAY TRAFFIC
ELIMINATE PKG. MAKE RDWY TWO WAY
INCREASE CORNER RADIUS
LOMASNEY
1019
107 RED
325
463
176
21
787

Figure VI.C-1: TEMPORARY ROADWAY ALIGNMENT - PHASE I

FIGURE VI.C-2

PROPOSED STREET IMPROVEMENTS NORTH STATION PROJECT - PHASE I & PHASE II



Under the reduced-scale optional development program, the circulation improvements would be basically similar, except that the island collector would not be constructed but would be replaced by a service road to the Rehabilitation Hospital and the Island park.

As part of an on-going design study of the reconstruction of the Central Artery, consultants to the Massachusetts Department of Public Works have investigated the feasibility of constructing a new connection from Leverett Circle/Storrow Drive to I-93/Tobin Bridge/ Central Artery in the City Square area of Charlestown. The implications of this proposal are examined in Section 6 below. However, since the implementation of this project is by no means certain and, in any case, is not foreseen in the near-term future, the potential impacts of a new connection have not been included in the North Station Phase II forecast year traffic analysis.

The major new roadway proposed for the project area is the Sub-area I access (or service) road connecting Lomasney Way with Accolon Way and Beverly Street. This road will serve to give access to the parking garages, the Arena parking, and other development in both sub-areas, to distribute traffic to, and collect traffic from, the proposed island loop road, and to allow direct connection to the Expressway ramps opposite Beverly Street. The access road is intended to be a two-way, forty-six foot wide street (12'-11'-11'-12' lanes) constructed beneath the Sub-area I parking garage and Arena structures, and parallel and adjacent to the Storrow Drive Connector ramps. The road also would tunnel beneath the MBTA commuter rail platform area (or possible future extension of the rail tracks-see Section 5 below). The feasibility of this road was studied in an engineering report prepared for the Boston Redevelopment Authority by C.E. Maguire, Inc., (1) which is included as Appendix H of this document.

Based on horizontal and vertical control points (e.g., sight distances, site restrictions, vertical clearances), maximum allowable grades, design speed assumptions, and tunnel construction requirements, four build options (in addition to a no-build) were designed. The designs included two major alternatives-one assuming the MBTA tracks would be extended into the Arena building (Alternative II) and the second assuming only the loading platform would be extended (Alternative III). Each of these, in turn, had two options-the tunnel would serve all vehicles (including trucks and buses) or passenger vehicles only.

The Maguire study concluded that, although there were severe constraints due to the existing expressway ramp pile foundation system and future foundation supports for the Arena and garage structures, existing utility easements, and future pedestrian concourse requirements, all four of the options were potentially feasible. Alternative II, with the all-vehicle option, would require the deepest tunnel section (to 23 feet below grade) and the steepest grades (12%), whereas Alternative III, allowing passenger vehicles only, would require a maximum depth below grade of only 10.5 feet and a minimum grade of 4% (which also would allow the design speed to increase from 20 mph to 30 mph). Because of the access road incline, a direct connection to Accolon Way would not be possible with Alternative II, but such connection would be feasible with Alternative III (although it would be optimal only with the minimum-depth tunnel of the alternative). Accordingly, two alternative designs have been developed for this intersection. In addition, depending on the alternative ultimately selected, the alignment of the connector roadway to the island may require an adjustment in location.

1.2 No-Build Alternative

Under the no-build alternative, there would be no changes or improvements in the street and highway system - both local and regional - in the North Station project area and environs. No new traffic would be generated from the project area, but traffic volumes on the area's streets and highways would be expected to increase at a normal annual rate of 0.5%. Some minor adjustment to traffic volumes on the area's roadways might occur as a result of the completion of the Central Artery North Area project in Charlestown (see Section 1.5 below), but no new improvements would be undertaken on the regional highway system - such as the depression or reconstruction of the Central Artery or a relocation of the Storrow Drive/Central Artery Connector ramps - which also could significantly impact traffic circulation and volumes in and around the North Station project area. Future levels of service would, in most instances, deteriorate due to increasing traffic volumes and existing inefficiencies in operation which would not be corrected (see Table VI.C-13), and the current congestion problems on Causeway Street, at Leverett Circle, and on the approach roads in the Bulfinch Triangle Area would continue to exist and even be exacerbated.

1.3 Traffic Projection Methodology

Traffic volumes to be generated by the proposed North Station development have been estimated for the Phase I development and for each of the two Phase II development programs described earlier in this EIR/EIS. It is expected that Phase I development will be completed in 1987 and Phase II development will be completed by the year 2000. Therefore, traffic generations from the North Station development have been estimated for these years for each of the development alternatives as well as for 1980, 1987 and 2000 for the No-Build option for use as a base condition.

The estimation process, which has been used in other Environmental Impact Reports for major developments in Boston, contains the following steps:

- Person-Trip Generation
- Employee/Non-Employee Trip Distribution
- Peak/Off-Peak Distribution
- Modal Split
- Vehicle Occupancy Rates
- Trip Distribution to Approach Corridors
- Trip Assignment to the Proposed Street System

This process and the result of its application are described in detail in the following pages.

North Station Development Alternatives

Usually, in order to estimate trip generations based on land use, a distinction is made between gross floor area and net feasible floor area. Public areas, service docks and other areas which do not generate significant amounts of person trips on their own are normally excluded from trip generation analysis. However, since a major preliminary design effort has not been initiated at this time, the gross floor area has been used as the base for trip generation estimates although the generation rates normally associated with net floor area were used. This will, therefore, yield a worst-case analysis which will most likely never occur. Table VI.C-1 provides a summary of the North Station development programs.

Program Combinations Used in Traffic Analyses

In subsequent traffic analyses in this EIR/EIS, only the office development option for the North Station site in the Phase I area (Alternate 1) is evaluated, since it represents the greater, and therefore worst case, traffic situation by a moderate amount of 1,320 person arrivals per average weekday in a total of 11,050, as shown in Table VI.C-2. With full project development, this alternative would represent an average weekday increase of only 7%-8% (preferred vs. optional program) over the hotel alternative (Alternate 2) for the North Station site. During the P.M. peak hour (full development), however, total volumes with the Alternate 1 development would be an estimated 12.6% and 15.3% higher for the preferred and optional programs respectively. In analyzing the Year 2000 development, the preferred and optional programs for Phase II are added solely to a Phase I/Alternate 1 program. While implementation of a hotel proposal in Phase I would reduce peak-hour traffic in the immediate vicinity of Sub-area I by as much as 15%, the distribution of this traffic throughout the local network would reduce the benefit of this decrease at more distant intersections and would have no effect on future levels of service at these intersections.

It also should be noted that the traffic presently generated by the existing parking lots in the area to be displaced by the redevelopment proposals have not been removed from the general traffic volumes for future years. Although this would tend toward a traffic overstatement, there is no reason to believe that the vehicles displaced would cease to come to the downtown and find accommodation in other parking facilities in the general area. This would be particularly likely in the case of parking associated with the Massachusetts General Hospital complex.

Arena Trip Generation

Not included in Table VI.C-2 and the subsequent analyses is the trip generation from the proposed new 16,800 seat arena. The reason is that arena events are not considered typical of an average weekday

TABLE VI.C-1

NORTH STATION DEVELOPMENT PROGRAMS ADJUSTED FOR TRAFFIC ANALYSIS

	PREFERRED PROGRAM			OPTIONAL PROGRAM			NO-BUILD
	Phase I	Phase II	Total	Phase I	Phase II	Total	(Existing (1980))
Retail/Commercial (square feet)	125,000	90,000	215,000	125,000	25,000	150,000	50,000
Office (square feet)	1,200,000 (800,000)[1]	0	1,200,000 (800,000)[1]	1,200,000 (800,000)[1]	490,000	1,690,000 (1,290,000)[1]	252,000
Hotel Units (Rooms)	0 (350)[1]	400	400 (750)[1]	0 (350)[1]	0	0 (350)[1]	500 (vacant)
Residential (Units)	0	1,100	1,100	0	300	300	104
Public Museum (square feet)	0	115,000	115,000	0	0	0	0
Hospital (beds)	0	0	0	0	284	284	284
Arena (seats)	16,800	0	16,800	16,800	0	16,800	15,320
Parking (spaces)	1,500	2,200	3,700	1,500	1,500	3,000	2,332

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[1] Alternate development options for Phase I (North Station development parcel)

TABLE VI.C-2

NORTH STATION AVERAGE WEEKDAY TRIP GENERATION

Phase I

	Arrival Rates Per Day	Daily Person Arrivals Alternate 1 (Office)	Daily Person Arrivals Alternate 2 (Hotel)
Retail/Commercial	18.3/1,000 s.f.	2,290	2,290
Office	7.3/1,000 s.f.	8,760	5,840
Hotel	4.6/Room	-	1,600
		11,050	9,730

Phase II

	Arrival Rates Per Day	Daily Person Arrivals Perferred Program	Daily Person Arrivals Optional Program
Retail/Commercial	18.3/1,000 s.f.	1,650	457
Office	7.3/1.000 s.f.	-	3,576
Hotel	4.6/Room	1,840	-
Residential	4.0/Unit	4,400	1,200
Public/Museum	10.0/1,000 s.f.	1,484	-
Hospital	4.0/Bed	-	1,140
		9,374	6,373

and because arena access normally does not occur during the A.M. or P.M. peak traffic hours nor during the peak 8-hour period (10:00 A.M. to 6:00 P.M.) used for the air quality assessments. Matinee events, when they do occur, are generally on Saturdays or Sundays. Therefore, a judgement has been made that arena access represents special events, albeit relatively frequent, at times when general traffic is not a peak levels, and thus has been excluded from a typical weekday.

A capacity arena event would, of course, generate about 16,800 arriving person trips. Based upon 60% arriving by automobile with a 3.6 average occupancy, approximately 2,800 cars would be used. Since this would exceed the 1,500 car capacity of the Phase I garages (as well as the total Phase I/Phase II commercial garage capacity of 2,600 spaces), other nearby parking facilities, such as the Government Center and Charles River Park garages, would have to be utilized, as at present. As a result, some of the arena trips would not enter the project or study area.

Person Trips

The office and retail generation rates were based on findings of the 1972 Wilbur Smith and Associates' Access Oriented Parking Strategy report.(2) The office rate - 7.3 person trips/day each way - reflects the average of the study's sample of major Back Bay and Downtown office buildings. As a comparison, the Institute of Transportation Engineers (ITE) has determined that trip generation rates for office buildings range from 2 to 22 trips per 1000 square feet per day with an average of 5.8.(3)

ITE suggests that trip generation rates for large shopping centers (over 1,000,000 square feet) range from 8 to 28 trips per 1000 square feet per day. Although the retail/commercial space proposed for North Station is significantly less than one million square feet, it is felt that the overall attractiveness of the North Station development with its major public spaces, canal, island, and excellent proximity to both public transportation and the regional highway network would generate the type of person trips normally associated with a larger retail entity. The trip generation applied to the North Station retail and commercial space, thus, is that experienced by Jordan Marsh's downtown full service department store - 18.3 trips per 1000 square feet per day.(2) This trip generation rate has been used to reflect the higher generation rates due to the attractiveness of the entire North Station development and to yield conservatively high trip volumes for traffic analysis purposes.

ITE also has found that 4.5 to 6.7 trips per room per day are generated by hotels. For North Station, the hotel trip generation rate of 4.6 trips per day per room was based on studies done for the proposed Copley Place development.(4)

For multi-unit residential developments, the ITE study showed that vehicle trips arrival rates ranged from 0.3 to 6.2 per unit per day in the buildings surveyed. A value of 4.0 arrivals is used in this study.

The trip generation rates applied to the proposed North Station development are presented in Table VI.C-2.

Employee/Non-Employee Distribution

Employees and non-employees (i.e. residents, hotel guests, office visitors, shoppers, etc.) travel at different times, stay for different lengths of time, and may come by different modes. Accordingly, they are distinguished in this analysis. The data in Table VI.C-3 are based on estimates of the numbers of employees expected to work at North Station computed as follows.

- 1 employee per 360 square feet of retail space
- 1 employee per 210 square feet of office space
- 1 employee per hotel room
- 1 employee per 11 residential units
- 1 employee per 2000 square feet of museum space
- 2.6 employees per hospital bed

Table VI.C-3 presents the proportion of person trips by employees and non-employees by land use and a summary of daily person trips to be generated by the North Station project.

Directional Flows for Peak and Off-peak Hours

The next factors determined were the peak hour and off-peak hour assignments of traffic to and from major land uses by employees and non-employees. These are based upon findings of the Park Plaza Project Transportation Impact Report prepared by Cambridge Systematics, Inc.(5) and revised for the North Station Project. Morning and afternoon peak travel periods are each approximately two hours in length and are separated by a seven hour off-peak period.

Table VI.C-4 indicates that 55% of inbound office employees arrive during the morning peak hour. Nearly all arrive during the whole peak period but more than half actually arrive during the busiest A.M. peak hour and leave during the busiest P.M. peak hour. On the other hand, only 10% of office visitors arrive or leave during the peak hours. Significant reverse flows are found in hotels (because some guests depart in the morning and arrive in the evening), and in stores where some employees and shoppers may arrive in the P.M. peak hour. Hotel employees such as kitchen, dining room and house service employees arrive and depart at odd hours. One shift arrives prior to the morning peak period; another departs late at night. Hence, relatively few hotel employees travel during peak and mid-day off-peak hours.

The 1100 residential units proposed for North Station will result in major reverse trips compared to office and commercial land uses. A large percentage (55%) will leave the project area in the morning peak hour and return during the evening peak hour. Table VI.C-4 summarizes the peak and off-peak hour assignments by land use and direction of travel for employees and non-employees. Table VI.C-5 converts these percentages to actual person trips destined to and from the North Station project.

TABLE VI.C-3

EMPLOYEE/NON-EMPLOYEE PERSON TRIPS

	% of Trips	Average Weekday Person Arrivals		
		Phase I	Phase II	
			Preferred	Optional
Retail				
Employee	15	343	247	69
Non-employee	85	1946	1403	388
Office				
Employee	66	5781	-	2360
Non-employee	34	2979	-	1216
Hotel				
Employee	24	-	442	-
Non-employee	76	-	1398	-
Residential				
Employee	2	-	88	24
Non-employee	98	-	4312	1176
Public/Museum				
Employee	5	-	58	-
Non-employee	95	-	1426	-
Hospital				
Employee	66	-	-	750
Non-employee	34	-	-	390
TOTAL				
Employee	178	6124	835	3203
Non-employee	422	4925	8539	3170
	600	11047	9374	6373

TABLE VI.C-4

PERCENTAGE OF AVERAGE WEEKDAY TRIPS DURING PEAK HOURS AND PRIME OFF-PEAK HOUR

	ARRIVE			DEPART		
	8-9 A.M.	OFF-PEAK	5-6 P.M.	8-9 A.M.	OFF-PEAK	5-6 P.M.
Retail						
Employee	10	12	10	0	12	20
Non-employee	0	10	5	0	10	10
Office						
Employee	55	2	0	0	2	55
Non-employee	10	15	0	0	15	10
Hotel						
Employee	5	5	0	0	5	5
Non-employee	7	8	3	3	8	7
Residential						
Employee	25	5	5	5	5	25
Non-employee	0	5	55	55	5	0
Public/Museum						
Employee	10	12	10	0	12	20
Non-employee	0	12	10	0	12	20
Hospital						
Employee	50	30	0	10	30	50
Non-employee	10	10	10	10	10	10

TABLE VI.C-5

PEAK HOUR AND OFF-PEAK HOUR PERSON TRIPS

	ARRIVALS			DEPARTURES		
	A.M.	Off	P.M.	A.M.	Off	P.M.
Phase I						
Retail/Commercial						
Employees	34	41	34	0	41	69
Non-Employees	0	194	97	0	194	194
Office						
Employees	3180	116	0	0	116	3180
Non-Employees	298	447	0	0	497	298
	3512	798	131	0	798	3741
Phase II Preferred						
Retail/Commercial						
Employees	25	30	25	0	30	49
Non-Employees	0	140	70	0	140	140
Hotel						
Employees	22	22	0	0	22	22
Non-Employees	100	112	42	42	112	100
Residential						
Employees	22	4	4	4	4	22
Non-Employees	0	216	2372	2372	216	0
Public/Museum						
Employees	6	70	6	0	70	12
Non-Employees	0	171	109	0	171	285
	175	877	2628	2418	877	563
TOTAL	3687	1675	2759	2418	1675	4304
Phase II Optional						
Retail/Commercial						
Employees	7	8	7	0	8	14
Non-Employees	0	39	19	0	39	39
Office						
Employees	1298	47	0	0	47	1298
Non-Employees	122	182	0	0	182	122
Residential						
Employees	6	1	1	1	1	6
Non-Employees	0	55	604	604	55	0
Hospital						
Employees	375	225	0	75	225	375
Non-Employees	39	39	39	39	39	39
	1847	596	670	719	596	1893
TOTAL	5359	1394	801	719	1394	5634

Modal Split

Modal split, i.e., the proportions of all trips made by auto, transit, or walking, is a very significant variable affecting forecasts of auto traffic. Assumptions that high proportions of North Station visitors will use public transportation (although likely and highly encouraged) might understate future traffic volumes and their environmental impacts. The joint effects of the major commuter rail terminus within the North Station project area and a major relocation of the Green Line elevated with emphasis upon joint development and integration of the rapid transit station with the proposed development would create an urban condition whose effect would significantly influence modal split. There are valid reasons why the modal split could become more transit and less automobile-oriented. The proximity of the project to the Downtown and Government Center areas will produce, from a traffic standpoint, a downtown condition. The large daytime population and relatively short walking distance between stores, offices, residences, government buildings, and leisure time facilities will result in people staying for a longer period of time once they arrive within the project area, more walking around, a greater interchange between hotel visitors, residents, and businesses, both office and retail, and an overall lower automobile use than currently exists among the present land uses.

With office space and residential units being the primary land uses in North Station, the majority of the retail space is expected to be occupied by establishments catering to the daytime population and the residential demands and, to a lesser degree, the auto-oriented users.

Among the considerations incorporated in the modal split percentages are the following specific data describing modal splits currently experienced in Downtown Boston.

- At Jordan Marsh's downtown store, 12% of the employees walk to work, 71% use transit, and 15% drive.

- The proportions of office workers using transit or commuter rail are as follows:

- First National Bank	73%
- State Street Bank	68%
- Liberty Mutual	41%
- John Hancock	54%
- Prudential	31%
- Hurley Building	50%
- John F. Kennedy Building	57%

Table VI.C-6 summarizes the above discussion and statistics as applied to the North Station project.

TABLE VI.C-6

MODAL SPLIT

Phase I

	Percentages			Average Weekday Person Arrivals			
	Auto	Transit	Walk	Auto	Transit	Walk	TOTAL
Retail/Commercial							
Employee	30	60	10	102	205	34	344
Non-Employee	40	20	40	778	389	778	1945
Office							
Employee	36	54	10	2660	2814	308	5782
Non-Employee	45	40	15	1341	1191	447	2979
TOTAL				4881	4599	1567	11047

Phase II
Preferred

	Auto	Transit	Walk	Auto	Transit	Walk	TOTAL
Retail/Commercial							
Employee	30	60	10	75	150	25	250
Non-Employee	40	20	40	560	280	560	1400
Hotel							
Employee	12	73	15	53	322	66	442
Non-Employee	60	25	15	838	349	210	1397
Residential							
Employee	25	60	15	22	53	13	88
Non-Employee	26	44	30	1121	1897	1294	4312
Public/Museum							
Employee	30	60	10	17	35	6	58
Non-Employee	40	50	10	570	713	143	1425
TOTAL				3144	3614	2283	9144

Phase II
Optional

	Auto	Transit	Walk	Auto	Transit	Walk	TOTAL
Retail/Commercial							
Employee	30	60	10	21	41	7	69
Non-Employee	40	20	40	155	78	155	388
Office							
Employee	36	54	10	850	1274	236	2360
Non-Employee	45	40	13	547	486	182	1216
Residential							
Employee	25	60	15	6	14	4	24
Non-Employee	26	44	30	306	517	353	1176
Hospital							
Employee	40	50	10	300	375	75	750
Non-Employee	50	40	10	195	156	39	390
TOTAL				2378	2939	1041	6373

Vehicle Occupancy

Vehicle occupancy rate - the average number of riders per car - varies by trip purpose. Average auto occupancy rates in downtown Boston are as follows:

	Persons/Vehicle	
	Employees	Non-Employees
Office	1.23	1.11
Jordan Marsh (retail)	1.00	1.12
Statler Hilton (hotel)	1.00	1.07

The Central Transportation Planning Staff (CTPS), using data generated by Wilbur Smith and Associates,(2) suggests that the following occupancy rates are experienced in downtown Boston:

Non-Home Based Trips	1.4 persons/vehicle
Work Trips	1.1 persons/vehicle
Home Based Non-Work Trips	1.75 persons/vehicle

The auto occupancy rates used in the traffic analysis for North Station are presented below:

Auto Occupancy Rates

	Retail	Office	Public/ Hotel	Residential	Museum	Hospital
Employees	1.4	1.5	1.3	1.3	1.3	1.4
Non-Employees	1.9	1.1	1.4	1.1	2.3	1.6

1.4 Future Traffic Demand and Impacts

Average Weekday Project-Related Vehicular Traffic

Applying the vehicle occupancy rates to daily person trips by auto yields the daily site-generated traffic, as indicated in Table VI.C-7. Peak hour site-generated traffic by direction is presented in Table VI.C-8, determined by applying the values of Table VI.C-4 to Table VI.C-7.

Approach Sectors

Trips to and from the North Station area were allocated to approach streets on the basis of data compiled in the 1977 Origin and Destination Survey for the Boston Central Artery (6) prepared by the Massachusetts Department of Public Works, supplemented by up-to-date intersection turning movement counts taken at 15 locations within the North Station Traffic Impact Area (Figure V-11). The North

TABLE VI.C-7

AVERAGE WEEKDAY DAILY NORTH STATION VEHICULAR TRAFFIC ARRIVALS

	Vehicles		
	Phase I	Phase II	
		Preferred	Optional
Retail/Commercial			
Employee	73	53	15
Non-Employee	409	295	82
Office			
Employee	1784	--	629
Non-Employee	1219	--	497
Luxury Hotel			
Employee	--	35	--
Non-Employee	--	524	--
Residential			
Employee	--	17	5
Non-Employee	--	1019	259
Public/Museum			
Employee	--	13	--
Non-Employee	--	248	--
Hospital			
Employee	--	--	214
Non-Employee	--	--	59
TOTAL			
Employee	1857	118	863
Non-Employee	1628	2086	896
	3485	2204	1759

TABLE VI.C-8

Peak-Hour North Station Vehicular Traffic

Phase I

	A.M. Peak-Hour		P.M. Peak-Hour	
	To	From	To	From
Retail/Commercial				
Employee	7	0	7	15
Non-Employee	0	0	20	41
Office				
Employee	976	0	0	976
Non-Employee	122	0	0	122
Sub-Total	1105	0	27	1154

Phase II
Preferred

	A.M. Peak-Hour		P.M. Peak-Hour	
	To	From	To	From
Retail/Commercial				
Employee	5	0	5	10
Non-Employee	0	0	15	30
Office				
Employee	345	0	0	345
Non-Employee	50	0	0	50
Luxury Hotel				
Employee	2	0	0	2
Non-Employee	37	16	16	37
Residential				
Employee	4	1	1	4
Non-Employee	0	560	560	0
Public/Museum				
Employee	1	0	1	3
Non-Employee	0	0	25	50
Sub-Total	394	576	622	481
TOTAL (Preferred)	1499	576	649	1635

TABLE VI.C-8 (continued)

Peak-Hour North Station Vehicular Traffic

Phase II
Optional

	A.M. Peak-Hour		P.M. Peak-Hour	
	To	From	To	From
Retail/Commercial				
Employee	2	0	2	3
Non-Employee	0	0	4	8
***Office**				
Employee	346	0	0	346
Non-Employee	50	0	0	50
Residential				
Employee	1	1	1	1
Non-Employee	0	143	143	0
***Hospital**				
Employee	151	30	0	151
Non-Employee	17	17	17	17
Sub-Total	567	191	167	576
TOTAL (Optional)	1672	191	194	1730

---

*49% of office trips and 100% of hospital trips are existing traffic from Registry Building and Massachusetts Rehabilitation Hospital.

Station Traffic Impact Area has been defined, by EOEA, to include the proposed Urban Renewal Area and adjacent areas within a perimeter bounded by Merrimac Street/Lomasney Way/Martha Road, New Sudbury Street, North Washington Street, and the Charles River, including the intersections along this perimeter. This assignment is indicated in Table VI.C-9 below. Appendix I shows the percentages of site-generated traffic assigned to streets within the North Station Traffic Impact Area. The actual site-generated traffic assigned to streets within the Traffic Impact Area for each of the build alternatives also is presented in Appendix I for the P.M. peak hours and in Figures VI.C-3a through VI.C-3c for the Average Weekday Traffic.

Table VI.C-9

Traffic Assignments by Approach

	%
North Washington Street Bridge	13
Commercial Street	8
Haymarket Southbound On-ramp	2
Blackstone Street	2
New Congress Street	9
New Chardon Street	2
Staniford Street	8
Storrow Drive	18
Charles River Dam	19
Leverett Circle On-ramp	6
Causeway Street Southbound On-ramp	13
	100

1987 and 2000 Traffic Volumes

Total future traffic within the North Station Traffic Impact Area has been forecasted by adding future background traffic and future project-generated traffic, for both the preferred program and the optional program. In calculating future background traffic, a uniform growth factor of 0.5% per year was utilized.

Total 1987 and 2000 P.M. Peak Hour Directional traffic volumes at intersections affected by the North Station development are presented in Table VI.C-10 for the preferred and optional programs. Figures VI.C-4a through VI.C-4e indicate 1987 and 2000 average weekday traffic volumes for the development programs (background plus site-generated), together with the No-build AWDT for comparative purposes.

Intersection Capacity Analysis

Analysis of the capacity of major street intersections in the study area was undertaken to assess the traffic impact of the North Station project on the proposed street system and on related environmental factors, such as air quality. The capacity calculations and the production of parameters required for the air quality

FIGURE VI.C-3(a)

TRAFFIC ASSIGNMENTS NORTH STATION

PHASE I 1987

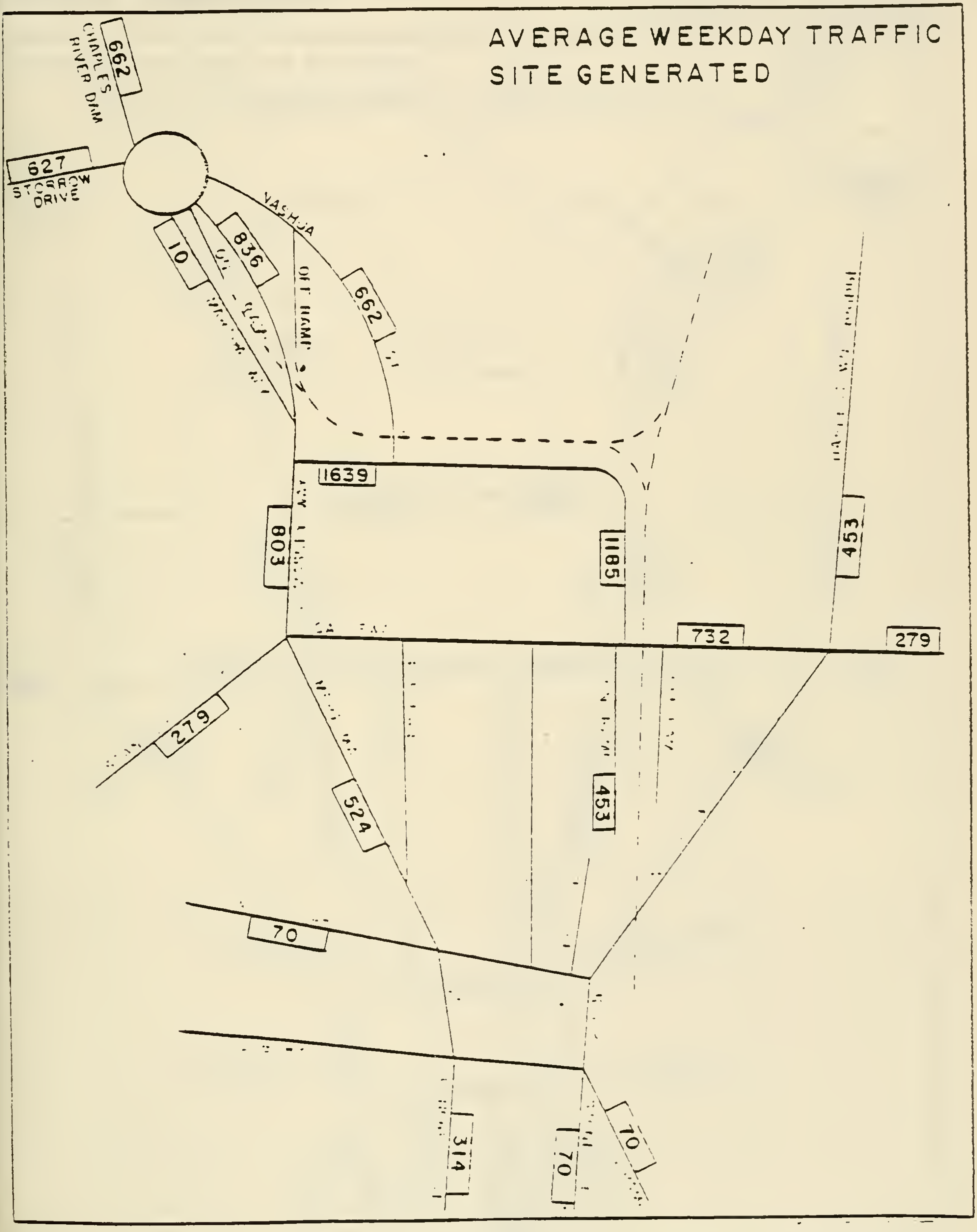


FIGURE VI.C-3(b)

TRAFFIC ASSIGNMENTS
NORTH STATION

PHASE II 200
PREFERRED PROGRA

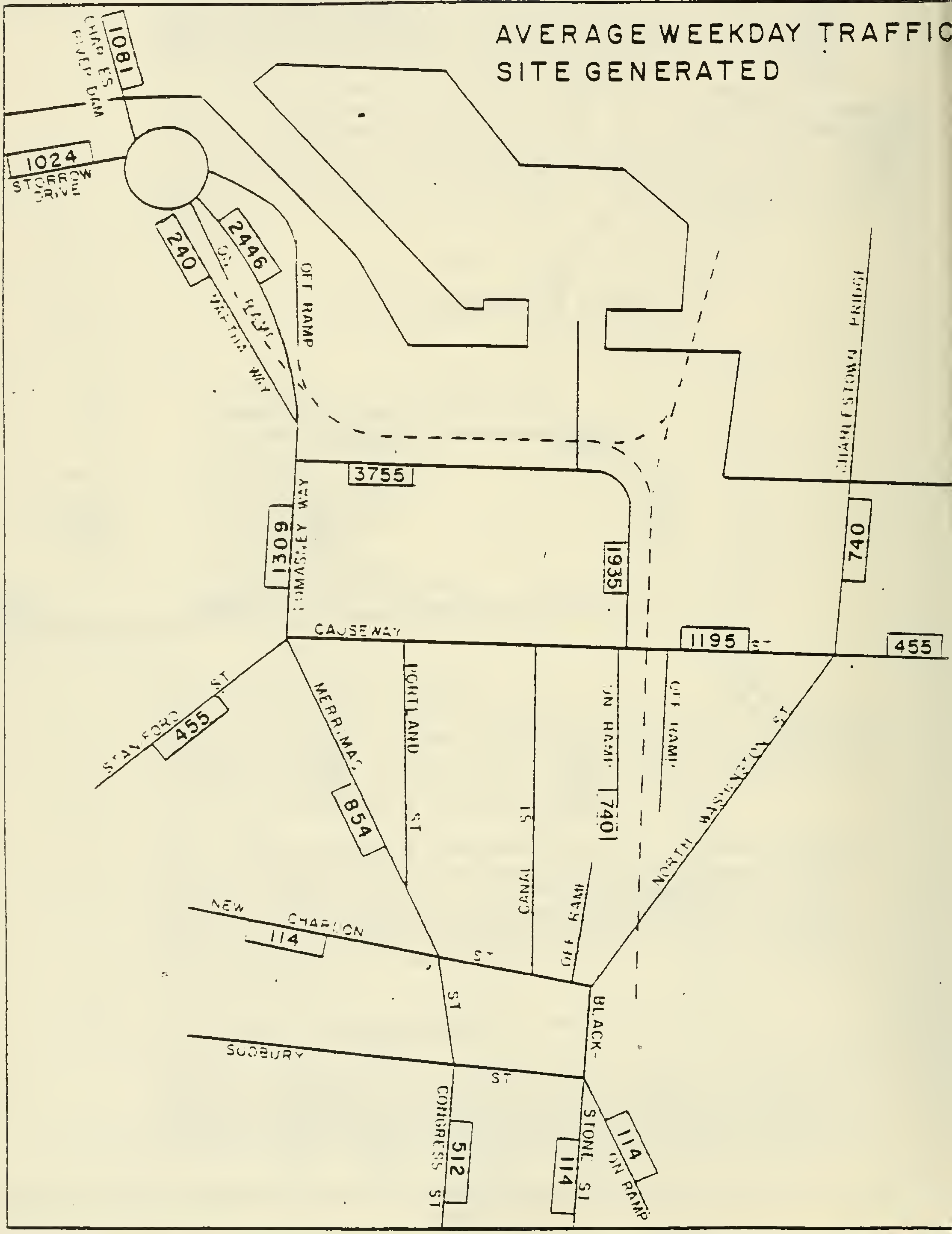


FIGURE VI.C-3(c)

TRAFFIC ASSIGNMENTS
NORTH STATION

PHASE II 2000
OPTIONAL PROGRAM

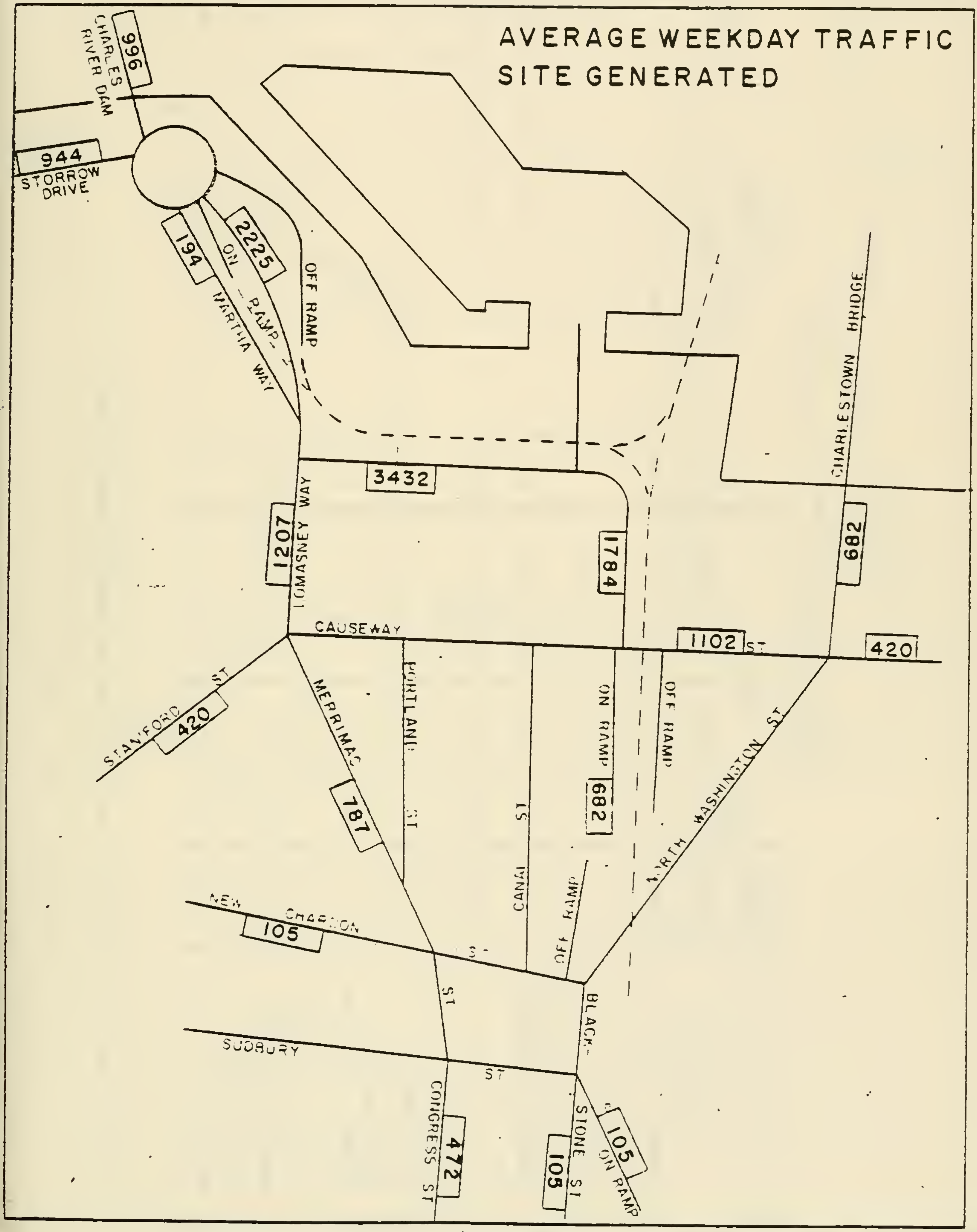


TABLE VI.C-10

Intersection Approach Volumes - P.M. Peak Hour

	1980	1987				2000						
Intersection	Existing	No Build	Build	Add on	% Increase	No Build	Preferred	Add on	% Increase	Optional	Add on	% Increase
Leverett Circle	5385	5544	6897	1353	24.4%	5894	8559	2665	45.2%	7341	1447	24.5%
Martha Rd., Lomasney Way*	371	478	3231	2753	575.9%	494	3530	3036	614.5%	3034	2540	514.2%
Lomasney Way, Causeway, Staniford, Merrimac Sts.	1250	1394	2902	1508	108.2%	1485	3557	2072	139.5%	3303	1818	122.4%
Keany Square	3023	3183	3449	266	8.3%	3368	4018	650	19.3%	3919	551	16.3%
Merrimac St., New Chardon St.	2054	2122	2278	156	7.3%	2242	2656	414	15.5%	2511	269	12.0%
Blackstone, New Chardon, N. Washington Sts.	1444	1495	1513	18	1.2%	1585	1619	34	2.1%	1591	6	0.03%
Congress, Merrimac, Sudbury Sts.	2455	2537	2695	158	6.2%	2673	3067	394	14.7%	2923	250	9.3%
Blackstone St., Sudbury St.	1182	1223	1241	18	1.5%	1322	1372	50	3.8%	1360	38	2.9%

*Increase includes relocated existing traffic due to Nashua St. discontinuance

IGURE VI.C-4(a)

AVERAGE WEEKDAY TRAFFIC NORTH STATION

1987 NO BUILD

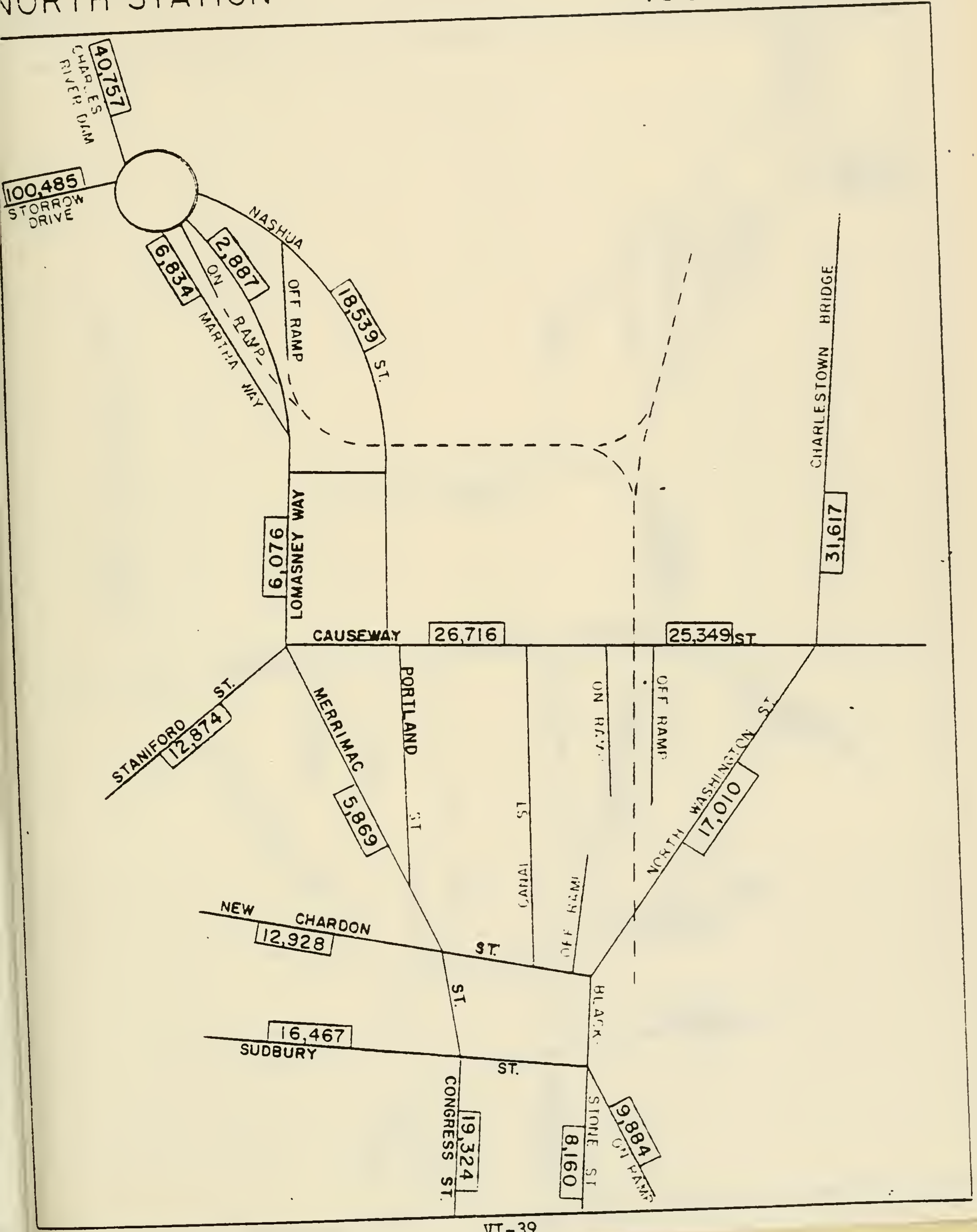


FIGURE VI.C-4(b)

AVERAGE WEEKDAY TRAFFIC NORTH STATION

PHASE I
1987

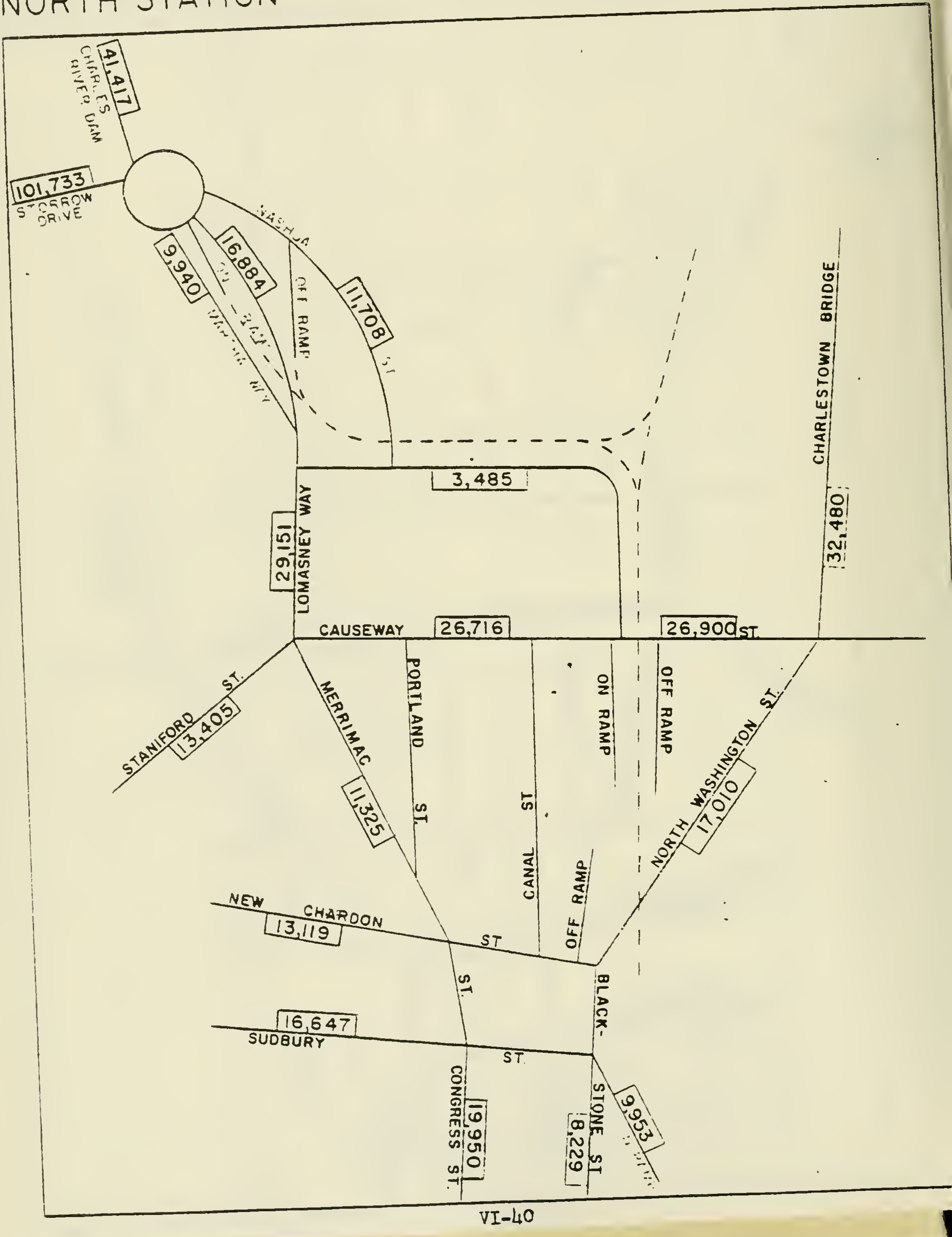
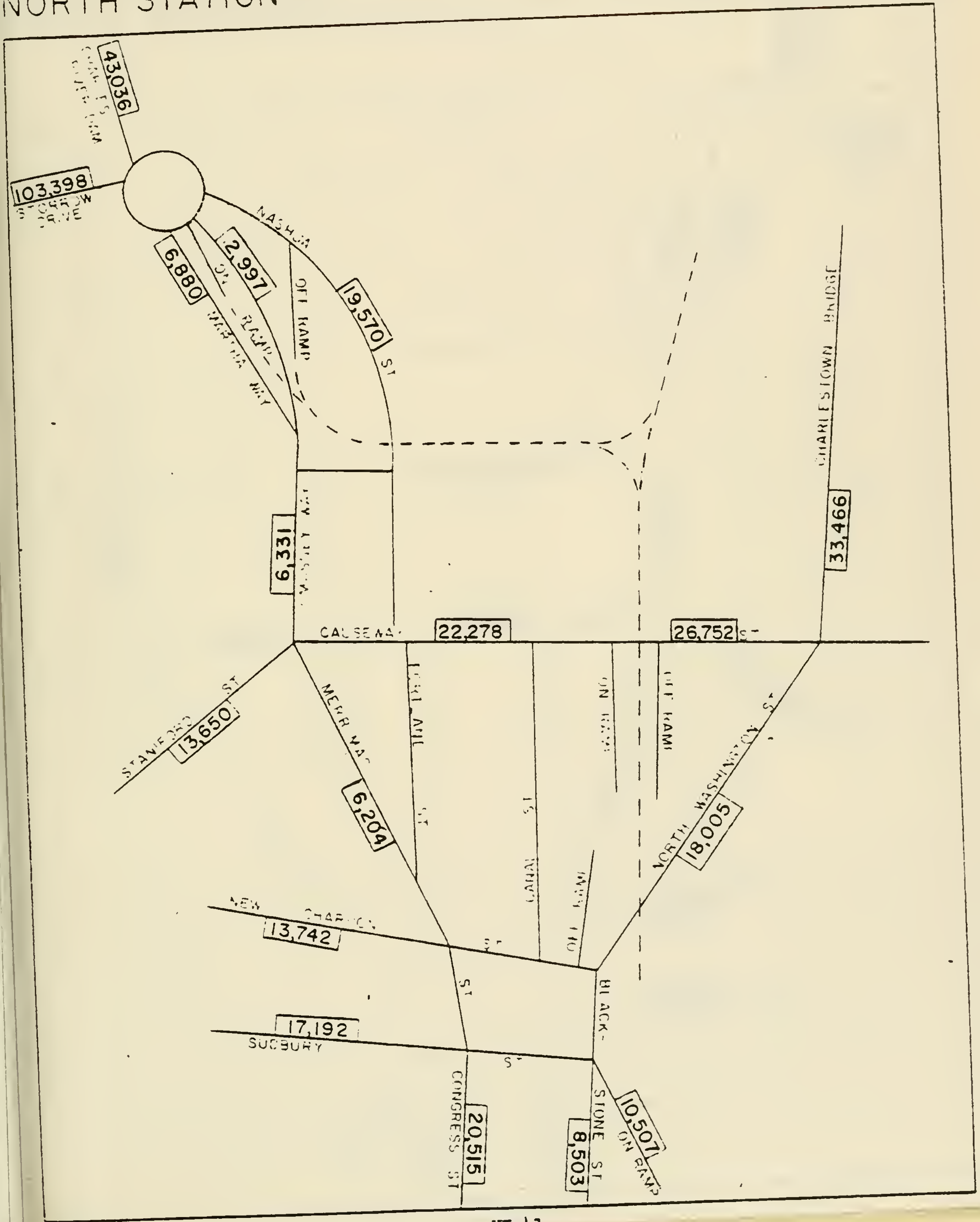


FIGURE VI.C-4(c)

AVERAGE WEEKDAY TRAFFIC NORTH STATION

2000 NO BUILD



AVERAGE WEEKDAY TRAFFIC
NORTH STATION

PHASE II 200
PREFERRED PROGRA

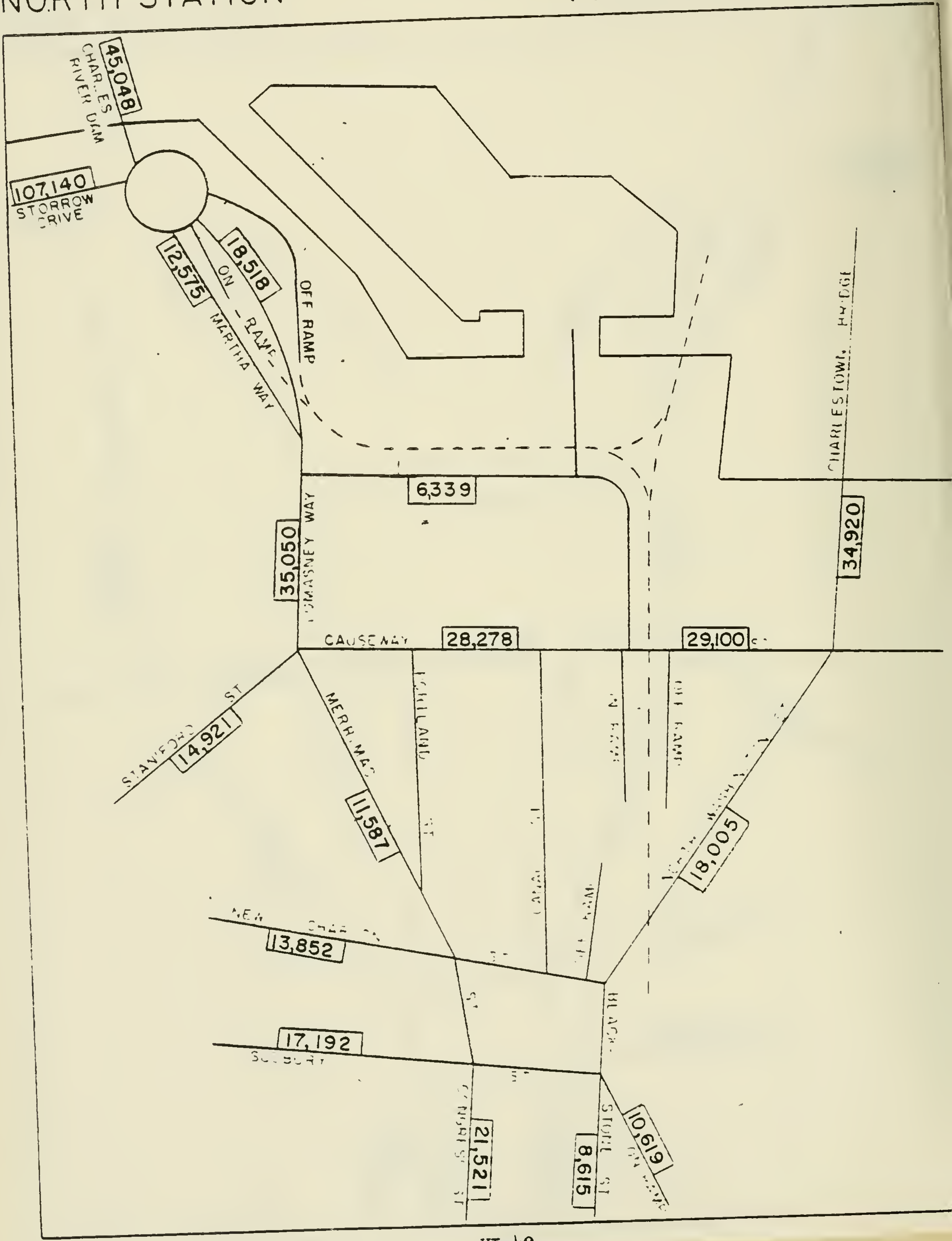
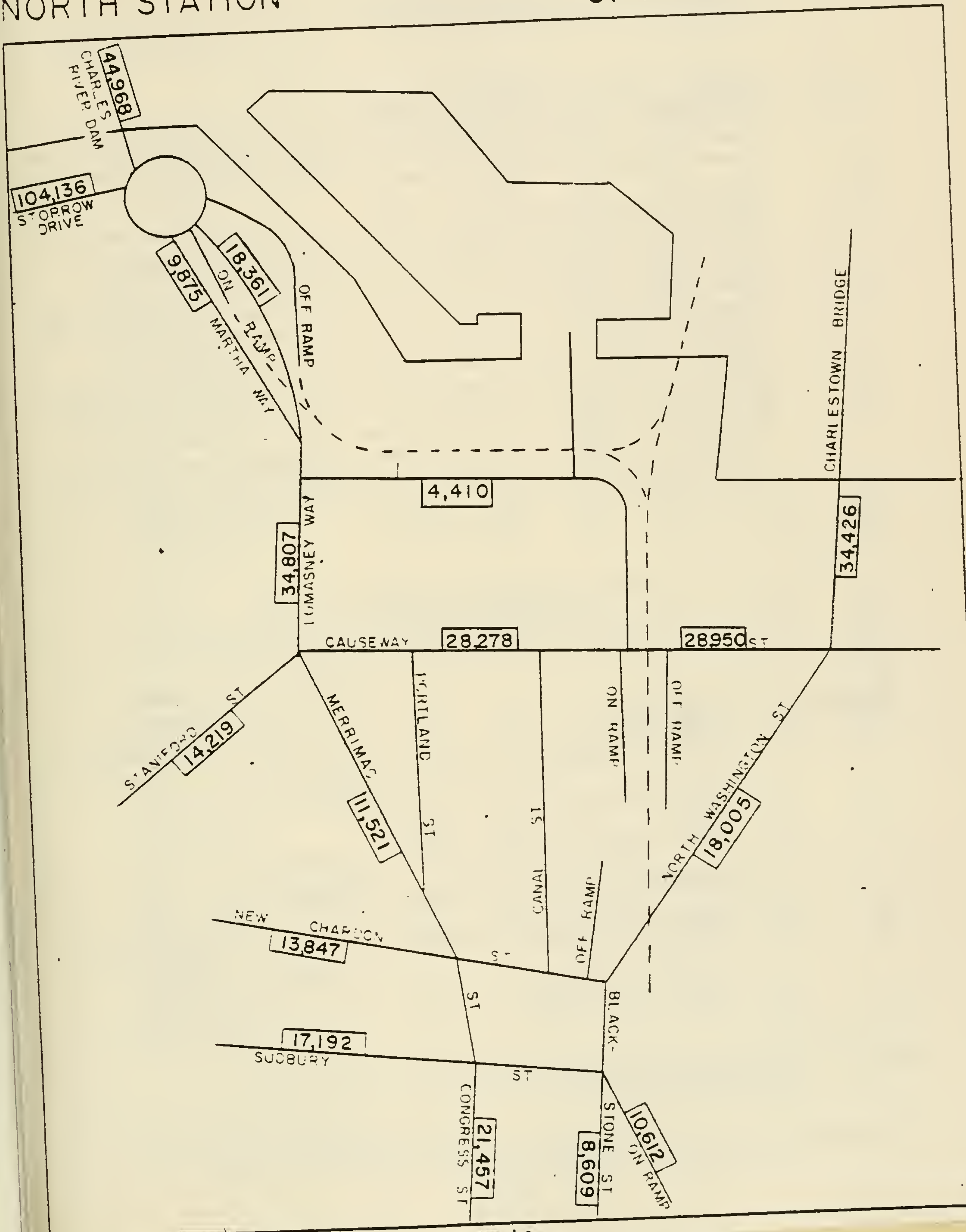


FIGURE VI.C-4(e)

AVERAGE WEEKDAY TRAFFIC NORTH STATION

PHASE II 2000 OPTIONAL PROGRAM



assessment were based upon a simplified critical lane method of analysis as presented in the National Cooperative Highway Research Bulletin 187.(7)

Each intersection was analyzed for the P.M. peak hour for existing (1980) conditions, the 1987 and 2000 no-build base condition, and the Phase I and Phase II (preferred and optional) development in the same corresponding future years. The volume-to-capacity ratios for these intersections are enumerated on Table VI.C-11.

Capacity analysis must assume a certain "Level-of-Service" which is related to the speed at which the traffic may flow, the number of stops, the occurrence of delays, etc. Lower volumes of traffic yield higher levels-of-service, so capacity must be defined at a given level-of-service. In the North Station analysis, capacity has been defined at Level-of-Service E, the maximum volume short of "jammed" conditions. Level-of-Service C is a standard goal for design in urban areas but cannot always be obtained due to right-of-way restrictions or other factors. For each intersection approach analyzed, a theoretical capacity was determined and then was compared to the actual or projected demand volume to determine level-of-service. However, it is important to understand that level-of-service is a somewhat subjective description of traffic flow quality. The definitions of the six levels-of-service are as follows:

Table VI.C-12

LEVELS-OF-SERVICE FOR DOWNTOWN STREETS
Traffic Flow Conditions
(Approximations, Not Rigid Criteria)

Level of Service	Description	Average Overall Speed (mph)
A	Free flow (relatively; some stops will occur)	≥ 25
B	Stable flow (delays not unreasonable)	≥ 20
C	Stable flow (delays significant but acceptable)	≥ 15
D	Approaching unstable flow (delays tolerable)	≥ 10
E	Unstable flow (congestion not due to back-ups ahead)	Below 10 but moving
F	Forced flow (jammed)	Stop & Go

Source: Highway Capacity Manual (Highway Research Board, 1965)

Table VI.C-11

North Station Project Area
Volume-to-Capacity Ratios
(P.M. Peak Hour)

	1980	1987		2000		
Intersection	Existing	No-Build	Scheme 1	No-Build	Preferred	Optional
Leverett Circle						
Charles River Dam	.55	.67	.69	.69	.89	.79
Nashua Street	.57	.66	.68	.70	.88	.79
Charles Street	.92	.97	.98	1.00	1.10	1.00
Leverett Circle	.89	.96	.96	.99	1.10	1.00
Lomasney Way/New Street						
New Street	-	-	.52	-	.91	.75
Martha Road	-	-	.13	-	-	-
Lomasney Way	-	-	.47	-	.70	.61
Lowell Square						
Lomasney Way	.23	.33	.73	.34	.96	.87
Merrimac Street	-	-	.75	-	.96	.85
Causeway Street	.12	.11	.30	.11	.39	.38
Staniford Street	.36	.45	.58	.48	.72	.68
Causeway St./X-Way Ramp						
Causeway Street (west)	.25	.31	.27	.34	.41	.32
Causeway Street (east)	.26	.51	.44	.54	.55	.48
Expressway Ramp	.21	.31	.69	.33	.74	.88
Beverley Street	.06	.13	.68	.13	1.10	.91
Keany Square						
Charlestown Bridge	1.10	1.00	1.10	1.00	1.30	1.30
No. Washington Street	1.00	1.00	1.10	1.00	1.30	1.30
Commercial Street (east)	1.00	1.00	1.10	1.10	1.20	1.30
Commercial Street (west)	1.10	.99	1.10	1.10	1.30	1.30
Merrimac St./New Chardon St.						
Merrimac Street (west)	.56	.57	.62	.61	.75	.70
Merrimac Street (east)	.56	.62	.64	.60	.76	.70
New Chardon Street (north)	.55	.57	.63	.59	.75	.69
Blackstone St./New Chardon St.						
No. Washington Street	.29	.30	.31	.33	.34	.33
Blackstone Street	.34	.35	.35	.37	.39	.37
Cross Street	.36	.38	.38	.39	.41	.40
Sudbury St./Congress Street						
Merrimac Street	.40	.41	.46	.45	.53	.51
Congress Street	.44	.45	.42	.49	.46	.43
Sudbury Street	.63	.67	.72	.67	.82	.78
Blackstone St./Sudbury St.						
Blackstone Street	.28	.37	.30	.33	.33	.41
Sudbury Street	.29	.27	.30	.32	.33	.30

Source: Boston Redevelopment Authority/Transportation Planning Department, Traffic Analysis Data for the North Station Urban Renewal Project, Boston, March 1982.

It is obvious from the North Station analysis that in a number of instances the calculated level-of-service appears to be higher than is apparent under observed conditions. This is due to the fact that operations at a number of existing intersections are congested through blockages stemming from other more critical conditions. Thus, back-ups from the Central Artery, Callahan Tunnel, Keany Square, or Charles Circle will cause stoppages at upstream intersections which otherwise would be operating satisfactorily. It is analytically difficult, if not impossible, to factor in these sporadic events into other individual intersections. The analysis presented below, however, does give a good comparative picture of potential circumstances at major points in the study area.

Once the level-of-service for the intersection as a whole had been determined, each individual approach to that intersection was analyzed to determine whether or not to make changes in the geometry of the approach, where possible, or to make improvements to the system as a whole to route traffic away from problem areas. The resultant recommendations based on this analysis are addressed in Section 1.5 below. Descriptions of each of the intersections follow.

Blackstone and Sudbury Streets

This intersection is currently operating at Level-of-Service A. It is not expected that this would change significantly by the Year 2000.

Congress, Merrimac and Sudbury Streets

Currently operating at Level-of-Service B, this intersection would drop to Level-of-Service D in the Year 2000 Preferred program. The major impacts on this intersection are due to the high volumes of traffic destined to the Sumner/Callahan tunnels which must pass through here, the traffic bound for the northbound expressway system which is by-passing the severe congestion at the tunnel plaza/northbound on-ramp area, and the North Station area traffic destined for the southbound expressways and the tunnels which chooses not to use the Causeway Street ramp because of back-ups on the Central Artery at the southbound off-ramp to the tunnels.

Merrimac and New Chardon Streets

The Merrimac/New Chardon Streets intersection currently has the capacity to operate at Level-of-Service A. This would drop to Level-of-Service C in the year 2000 Preferred build situation and to Level-of-Service B in the Year 2000 Optional build. The high percentage of left turns from New Chardon Street westbound and Merrimac Street northbound would be the major intersection demands.

Blackstone, New Chardon and North Washington Streets

Currently at Level-of-Service A, this intersection would not change significantly upon completion of the North Station development.

As noted above, each of the four intersections just described, located in the Haymarket Square area, was analyzed independent of outside influences. Frequently, however, severe congestion does occur in this area where the capacity analysis indicates it should be much less or not exist at all. The major sources of congestion here include back-ups from the Callahan Tunnel and the Central Artery southbound on-ramp and the congestion along North Washington Street from Keany Square.

Keany Square

Keany Square, the intersection of Causeway and North Washington Streets, is currently operating at Level-of-Service E but would drop to F in the future. This is due generally to the high volumes of traffic going through the square and specifically to the high left-turn volumes in the southbound and eastbound approaches. The North Station development adds 8.3% to the volume of traffic using Keany Square in 1987 compared to the No-Build and 19.3% to the year 2000 volumes (Preferred program). These significant increases in the already congested conditions is a situation that must and will be addressed.

Beverly Street, Causeway Street, Expressway Ramps

Although this new intersection affords the North Station development with the most direct access to and from the Central Artery, a Level-of-Service of F would be created with the Preferred program in the Year 2000 and a Level-of-Service of D with the Optional program.

Causeway, Nashua and Portland Streets

Now operating at Level-of-Service C, this intersection would drop to Level-of-Service D in 2000 if no project is initiated in the North Station Area. However, with the closing of Nashua Street, the widening of Lomasney Way and Merrimac Street, and the reconstruction of Causeway Street, a Level-of-Service of A would be obtained for all build options through the year 2000.

Leverett Circle

Current levels-of-service for Leverett Circle, which consists of several intersections, range from A at the Charles River Dam approach to D at the Storrow Drive approach. These would drop to B and E respectively in the 1987 Build option, to D and F in the 2000 Preferred option and to C and E in the 2000 Optional program situation.

Causeway, Merrimac, Staniford Streets and Lomasney Way

This intersection currently operates at Level-of-Service A but would drop to Level-of-Service E in 2000 with the North Station Preferred development and to D with the Optional development, due to significant increases in traffic at this intersection from the closing of Nashua Street.

Lomasney Way, Martha Road and New Street

This intersection, if created as in the preliminary street plans, will operate at Level-of-Service D under the Preferred build option and at Level-of-Service C under the Optional build option.

Summary

A summary of the existing and projected levels-of-service for the major intersections within the North Station Traffic Impact Area is presented in Table VI.C-13 and on Figures VI.C-5a through VI.C.5e.

1.5 Measures to Avoid and Minimize Adverse Impacts

The four intersections where North Station development plans would have a significant negative impact are Leverett Circle, Keany Square, Lomasney Way at Causeway Street (Lowell Square), and Causeway Street at the Expressway ramps. There are currently some major transportation improvement projects in preliminary stages that could have positive effects on the North Station area. One is the reconstruction of the I-93/Tobin Bridge interchange in Charlestown. The major improvement in this project will be the elimination of the dangerous and severely congested weave section over the Charles River. It is expected that this could result in a redirection of the local street traffic on the North Washington Street Bridge and the (old) Charles River Dam. Both of these facilities currently are heavily used by vehicles by-passing the congested river crossing during the morning and evening peak hours. Since it is estimated that the construction of the new ramps in Charlestown would be completed at approximately the same time as completion of the North Station Phase I development, some relief of local street and intersection congestion in the area might be realized. The improved expressway conditions would encourage trips which now by-pass onto local streets to return to the expressway facilities.

The second major highway improvement is the proposed relocation of the Storrow Drive/Central Artery Connector ramps and the reconstruction of Leverett Circle itself. This would remove all Storrow Drive-to-ramp traffic from the signalized intersection at Leverett Circle. The effects of this proposal are discussed in Section 6 below.

Similarly, the proposed widening of the Central Artery and the Charles River bridges would significantly increase capacity on the Artery and thus should reduce the current inclination to by-pass daily Artery congestion via Keany Square and the North Washington Street bridge. This improvement, together with the proposed on- and off-ramps at Causeway Street, should minimize the present congestion at Keany Square. On the other hand, however, the Central Artery proposals as presently conceived could result in increased traffic on local streets in the North Station area (see Section 7 below).

Table VI.C-13

NORTH STATION

Existing and Projected Levels-of-Service

No.	Intersection	Existing 1980	No Build 1987	Phase I 1987	No Build 2000	Preferred 2000	Optional 2000
1	Charles River Dam - Leverett Circle	A	B	B	B	D	C
2	Charles St. - Martha Way Leverett Circle	D	E	E	E	F	E
3	Lomasney Way - New St.	N/A	N/A	A	N/A	D	C
4	Lomasney Way - Merrimac St. Causeway St. - Staniford St.	A	A	C	A	E	D
5	Causeway St. - Nashua St. - Portland St.	C	D	N/A	D	N/A	N/A
6	Causeway St. - Expressway Southbound	A	C	B	D	F	D
7	Keany Square	E	E	F	F	F	F
8	Merrimac St. - New Chardon St.	A	A	B	A	C	B
9	Blackstone St. - New Chardon St.	A	A	A	A	A	A
10	Sudbury St. - Congress St.	B	B	B	B	D	C
11	Blackstone St. - Sudbury St.	A	A	A	A	A	A

FIGURE VI.C-5(a)

PM PEAK HOUR LEVEL OF SERVICE ANALYSIS

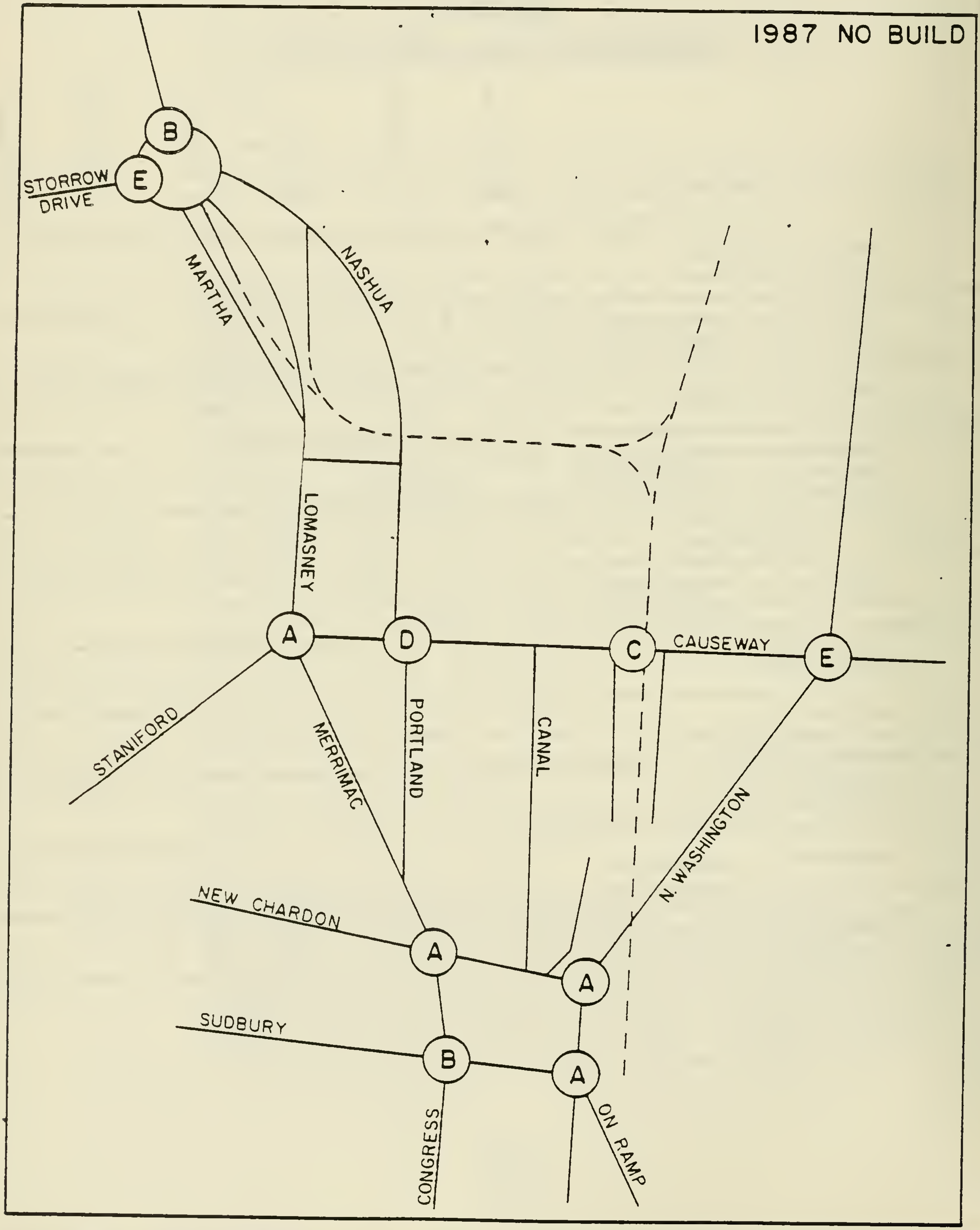


FIGURE VI.C-5(b)

PM PEAK HOUR LEVEL OF SERVICE ANALYSIS

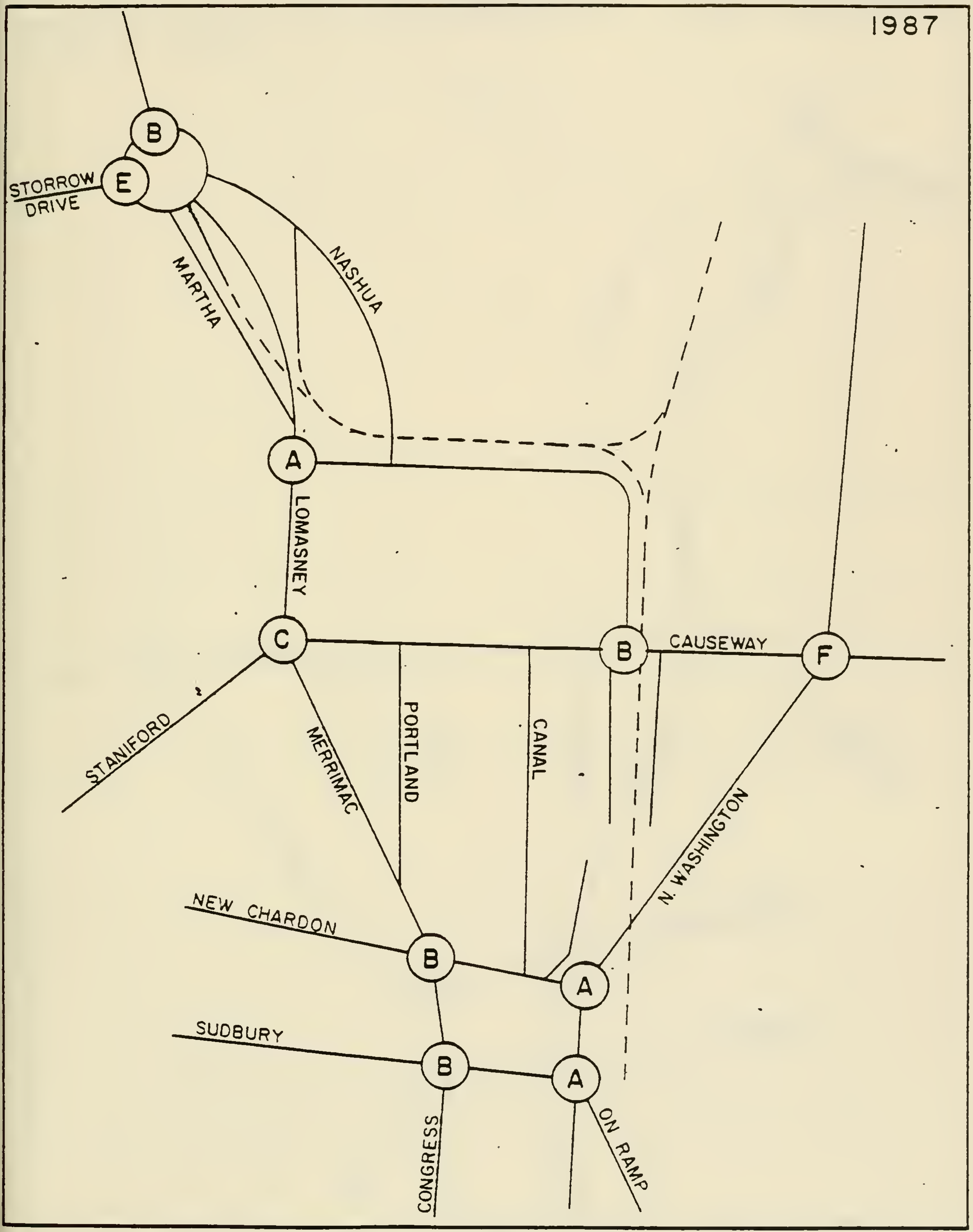


FIGURE VI.C-5(c)

PM PEAK HOUR LEVEL OF SERVICE ANALYSIS

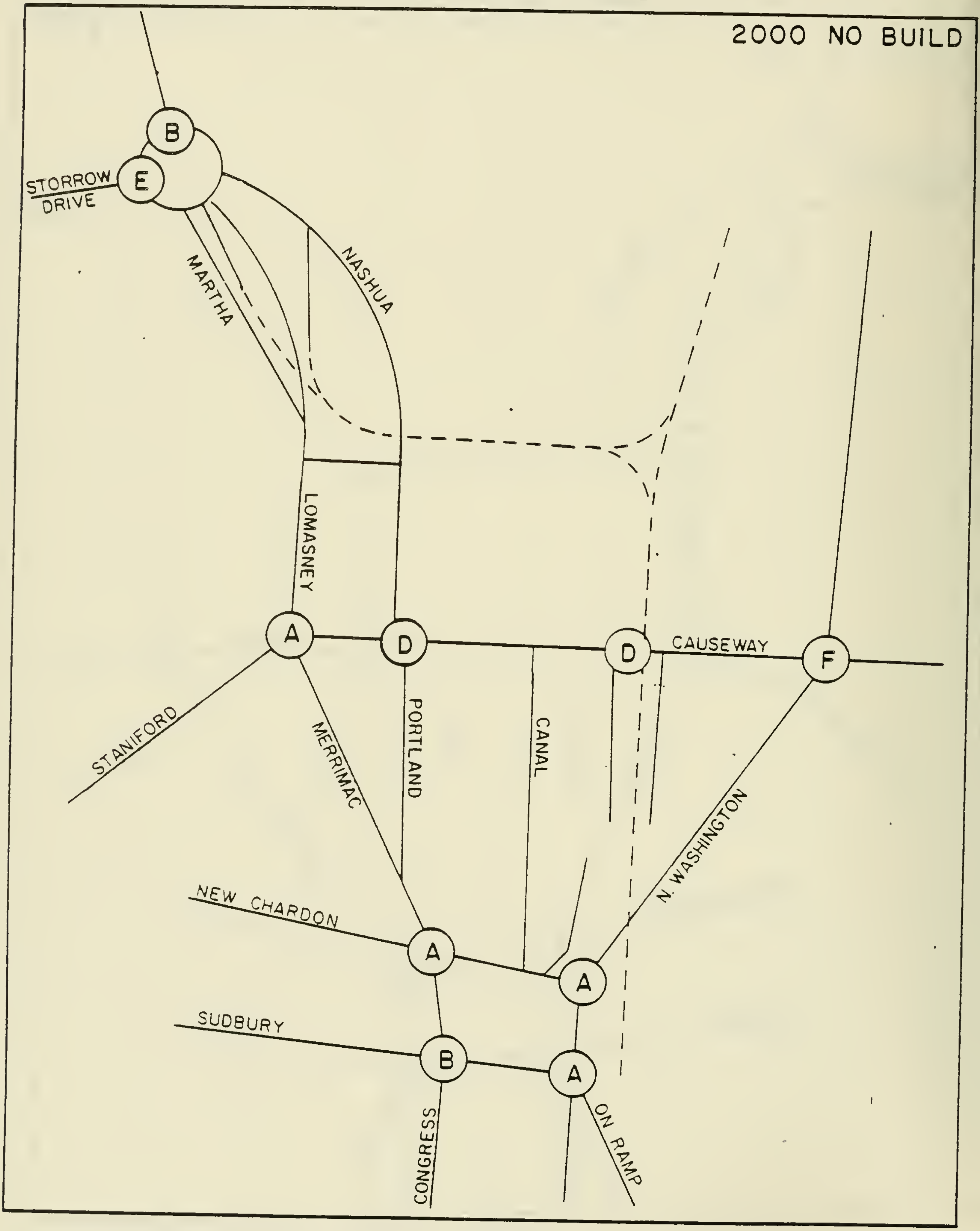


FIGURE VI.C-5(d)

PM PEAK HOUR
LEVEL OF SERVICE ANALYSIS

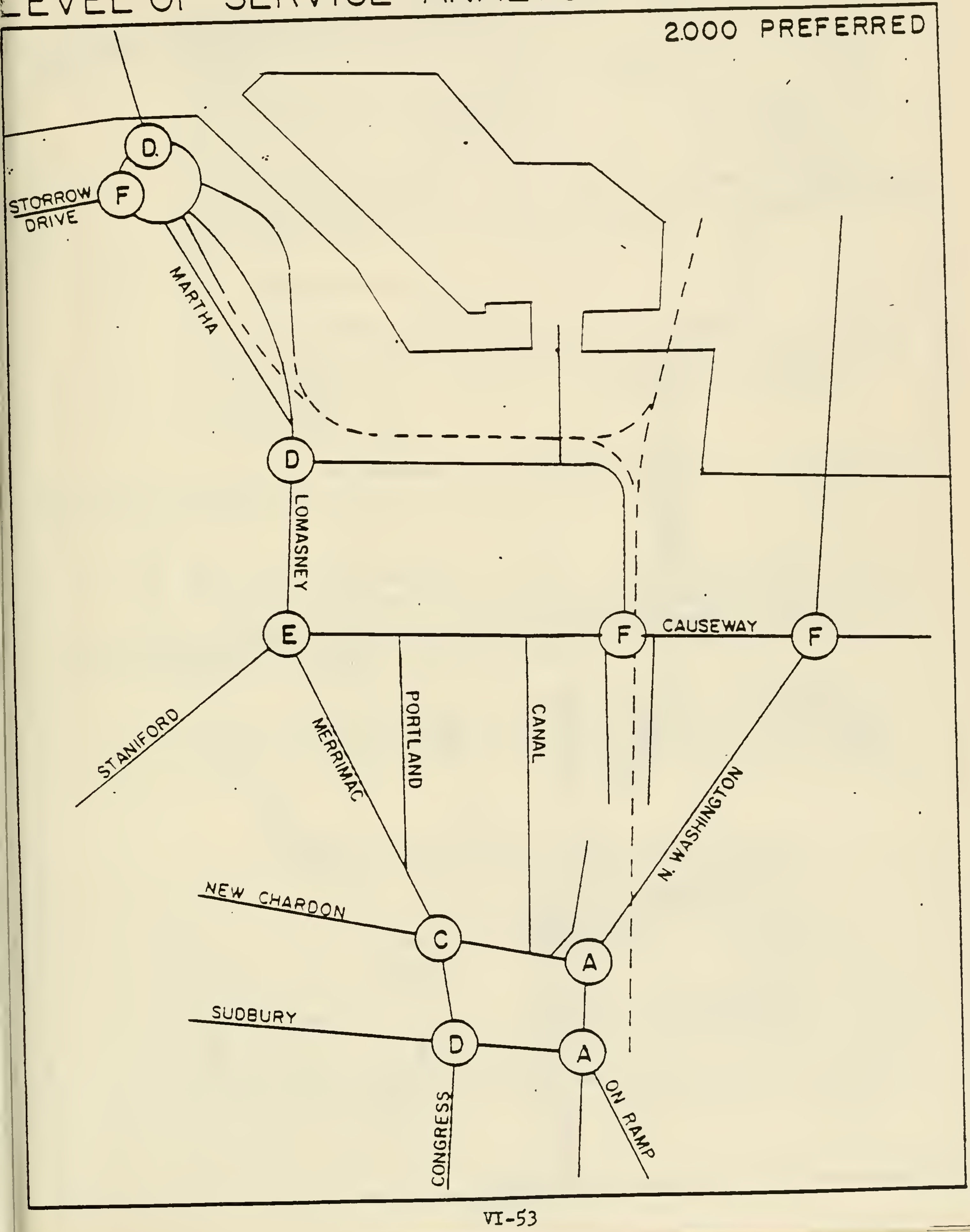
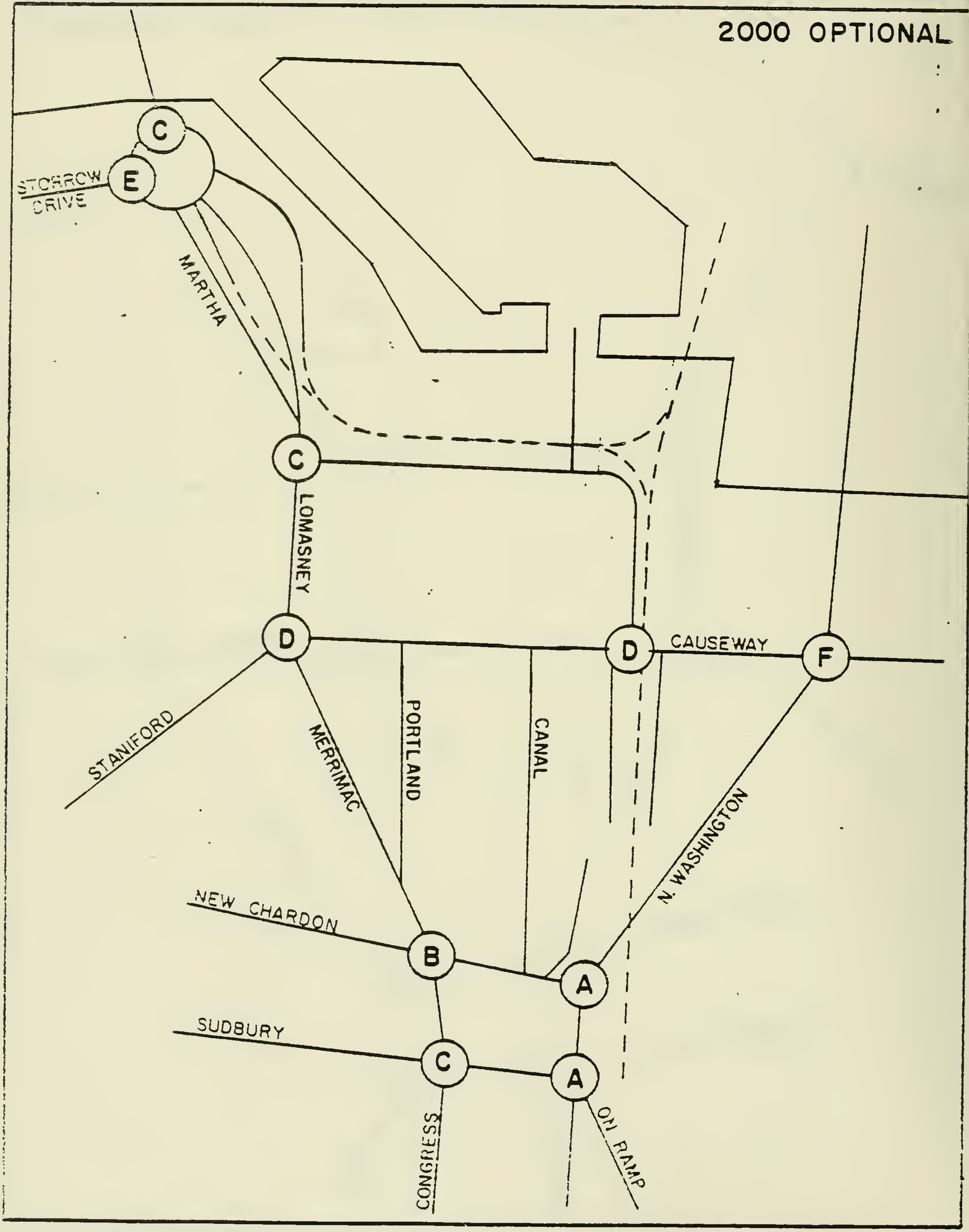


FIGURE VI.C-5(e)

PM PEAK HOUR LEVEL OF SERVICE ANALYSIS



Other measures which could be implemented are signal coordination and progression for the entire system within the Traffic Impact Area and further refinements of geometry and lane usage at the critical intersections. It is anticipated that these would have significant positive effects on the North Station circulation system. Each of these measures will be investigated in further detail during the engineering phase of the street improvements. In this regard, the City is committed to the implementation of necessary improvements in roadway geometry and traffic signal timing to achieve improved traffic flow and reduced air pollutant levels (see letters of commitment included with responses to comments from EPA and DEQE in Part VIII of this document).

1.6 Taxi and Truck Traffic

Wilbur Smith and Associates found that 46% of the hotel non-employee arrivals by auto and 3% of office non-employee arrivals by auto were taxi passengers or were dropped off by drivers who proceeded to another destination.(2) Virtually no employees arrived by taxi although 10% were dropped at their places of work by drivers who proceeded elsewhere.

Surveys done for the Copley Place hotel developments of non-employee arrivals at the Colonnade and Sheraton Boston Hotels (4) determined that 34% of the auto arrivals were taxi.

Use of taxis by residents in an urban complex such as proposed for North Station is expected to be significant. On an average, 21% of the residents in downtown Boston who own automobiles do not use them in the course of a day. This percentage increases to about 35% in the Charles River Park development. Approximately 40% of the residents in the West End do not own cars.

Table VI.C-14 presents the estimated breakdown of auto arrivals at the North Station development components by autos to be parked at the site and by autos/taxis that are to be driven to another destination.

Table VI.C-14

Percentage of Auto Trips to North Station by Type

	Auto Drivers and Shared Riders	Drop-Off and Taxi
Hotel	55%	45%
Office	85%	15%
Retail/Commercial	85%	15%
Residential	75%	25%

Truck traffic expected to be generated by North Station is summarized in Table VI.C-15.

Table VI.C-15

North Station Truck Traffic
(Arrivals)

PHASE I

	Truck Generation Rate	Average/Day	Peak Truck Hour
Hospital	.12/room	-	-
Hotel	.12/room	-	-
Office	.21/1000 s.f.	252	37
Retail	.24/1000 s.f.	30	3
Residential	.14/unit	-	-
TOTAL		282	40

PHASE II

PREFERRED PROGRAM

	Average/Day	Peak Truck Hour
Hospital	-	-
Hotel	48	6
Office	-	-
Retail	22	3
Residential	154	15
TOTAL	224	24

OPTIONAL PROGRAM

	Average/Day	Peak Truck Hour
Hospital	34	4
Hotel	-	-
Office	103	15
Retail	6	1
Residential	42	6
TOTAL	185	26

About 50 trucks per average hour and 65 trucks per peak hour are expected to deliver to the entire project site. If it is assumed that the peak hour arrivals also depart in the peak hour, a maximum of 100 to 130 trips per peak hour would occur. The truck peak hour would occur in mid-morning or afternoon, not in the peak traffic hours for general site traffic.

2. Parking Facilities

Phase I development will result in the closing of all 605 public spaces in Sub-area I. These will be replaced by 1,500 new public spaces to serve the Phase I development and particularly events at the new Arena (an additional 267 spaces will be included within the proposed Federal Office Building for exclusive use by the Federal government). Phase II development will cause the elimination of the existing 1,727 public and private spaces in Sub-area II, to be replaced by 2,200 new spaces for the exclusive use of the proposed land development. In the Phase II optional program, 1,500 new spaces would be constructed in Sub-area II, all of which would be reserved for existing land uses to remain and for the new Phase II development. Under both options, residential parking spaces would be provided at the ratio of one space per dwelling unit.

Table VI.C-16

Existing and Proposed Parking

	1980	1987	2000 Preferred	2000 Optional
Sub-Area I	605	1,500	1,500	1,500
Sub-Area II	1,727	1,727	2,200	1,500
TOTAL	2,332	3,227	3,700	3,000

In accordance with the parking freeze regulations mandated by the Boston Transportation Control Plan, those parking spaces provided which are accessible to the general public for a fee and which are in excess of the existing 905 public spaces in the project area will require the elimination of an equivalent number of spaces elsewhere in downtown Boston. At the present time, however, the parking freeze is being reviewed by the City of Boston for possible recommendation to EPA for modification, based upon a parking and development study which explores several options to match future development against parking demand and supply. One option is to allow certain projects, such as North Station, to provide reasonable parking consistent with satisfactory access, above the current freeze level - an option that would directly account for this project.

There is a reasonable match between the parking demands generated by site development compared with the proposed on-site parking supply. Using an average daily arrival to peak parking accumulation ratio of 2.3, as found typical of downtown Boston in the Wilbur Smith parking survey,(2) peak accumulations were assessed for all development conditions.

In Phase I, the average weekday site generation indicates a peak accumulation of somewhat over 1,500 cars, compared to the 1,500 commercial plus 267 G.S.A. spaces. This represents a reasonable correspondence for average weekday conditions. As pointed out below, however, the parking demands of arena events cannot be completely satisfied by the on-site supply.

For Phase II (Preferred), the 1,100 residential spaces match the 1,100 residential units on a one-to-one basis. The non-residential 1,100 spaces can be accounted for by a non-residential site-generated peak parking accumulation of approximately 300 spaces (accounting for hotel auto access by taxis which require no parking) and 800 spaces as replacement parking for the Massachusetts General Hospital (MGH). The Phase II Optional development provides a total of 1,500 additional spaces, accounted for by 300 residential, somewhat over 600 peak accumulation of non-residential, and an allowance of about 600 spaces for MGH replacement parking.

It should be recognized that the Phase II development program is as yet not firmly established and committed so that better definition of parking needs and supply must await more detailed planning in the future.

As noted previously (Section 1.3), a full-capacity arena event would generate approximately 2,800 cars to the project area, which number would exceed both the 1,500 spaces in the Phase I garages and the total project area commercial parking capacity of 2,600 spaces. Because in practice the total garage capacity of 1,500 (Phase I) or 2,600 (total project) would not be available for arena events, due to other site demands, it is estimated that only 80% or 1,200 spaces in Phase I and 2,080 spaces in the total project area could be utilized. As at present, the remaining demand could be met by other nearby parking facilities, such as the Government Center, Charles River Park, and Polcari's garages, which probably have a net supply of over 3500 spaces outside of weekday daytime hours.

With the no-build option, the existing 2,332 surface parking spaces would be expected to remain and no significant changes in supply would be anticipated. Some additional surface parking might be provided if any of the existing buildings, particularly in the Billerica Street blocks, are demolished in the future.

During the construction periods, the major short-term impact would involve the loss of the existing parking spaces. For Phase I development, approximately 340 of the total 605 spaces would be eliminated at one time (depending on the construction schedule of the new Arena). This would mean the temporary loss of both daytime commuter and nighttime/weekend Garden events parking, which possibly could occur at the same time that the Green Line transit operations are interrupted for upgrading or replacement. Nearby parking facilities, however, most likely could satisfy the displacement; according to a recent (February 1982) BRA survey, the Government Center garage was only approximately two-thirds full at 10:00 A.M. and had 588 spaces available. Following development, the existing parking in Sub-area I would be replaced by a considerably greater supply of 1,500 spaces.

Phase II development probably would eliminate all existing parking (1,727 spaces) in Sub-area II at the same time (although the 552 DPW employee spaces would not be needed since the DPW would have moved into the new State Transportation Building by 1984). The 800 MGH employee spaces could be temporarily relocated to the Phase I garage, if necessary, to minimize the loss of this parking. With completion of the Phase II development, an additional 2,200 parking spaces would be provided, including 1,100 spaces reserved for the housing development and 800 spaces to replace the MGH lot. At the same time, improvements to the Green Line and commuter rail facilities could result in increased usage of public transportation in the area, reducing the dependency on the personal automobile.

Also during the construction period construction workers would increase the demand for parking and could further exacerbate the temporary parking deficiencies in the North Station area. Part of the worker-parking demand could be satisfied on-site during a portion of the construction period, or existing remaining parking lots (such as the DPW lots during the latter stages of Phase I) could be used. Use of public lots would, of course, displace daily commuters.

3. Pedestrian and Bicycle Circulation

Both the Preferred and Optional development proposals provide for extensive pedestrian circulation improvements in the North Station project area (Figure VI.C-6). Besides widened sidewalks along the peripheral streets (Causeway Street and the Lomasney Way arterial), major traffic-free pedestrian walkways are proposed in an east-west direction as a promenade beside the new canal and in a north-south direction from Causeway Street to the Island.

The canal promenade would extend from the present end of the Esplanade at the old Charles River Dam through proposed new parkland and public easements to the new Charles River Dam, connecting with the major north-south pedestrian walkway. This walkway, leading from the Island, would cross the proposed canal above the railroad tracks and extend as an arcade from the canalfront promenade through the project development to the public plaza on Causeway Street, directly connecting to the Canal Street Mall, thus providing a pleasant pedestrian path from the project area to the Haymarket/Government Center area of the Downtown. Pedestrian easements and walkways also would be located around the edge of the Island, and several smaller easements would be provided on the land side of the project. In addition, a bicycle path is proposed along with the canal promenade, with connections to the Island.

In order to provide a safe and enjoyable pedestrian environment, the Renewal Plan proposes to separate completely pedestrian and vehicular traffic from one another by placing the promenade and walkways on platforms above the roadways and railroad tracks.

No new facilities or amenities for either pedestrians on bicyclists would be provided under the No-build option. Without the project, the planned riverfront promenade and construction of the Esplanade pedestrian paths to the New Charles River Dam park would unlikely be implemented.

NORTH STATION
REDEVELOPMENT
PROJECT

BOSTON REDEVELOPMENT AUTHORITY

PROPOSED
PEDESTRIAN EASEMENTS

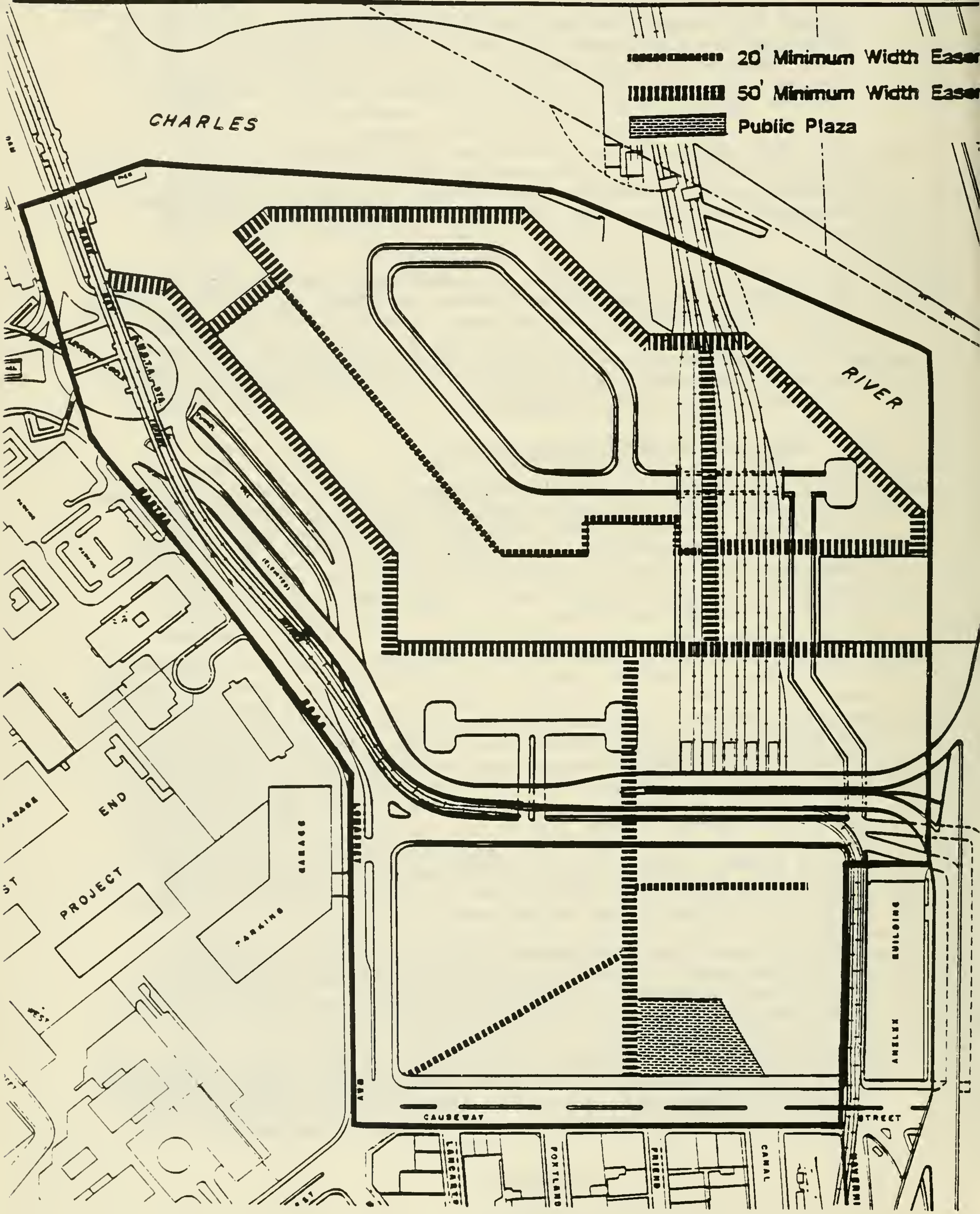


Figure VI.C-6

4. Green Line Elevated Relocation

4.1 Background

A major proposal of the North Station Urban Renewal Plan is the demolition of the existing Green Line elevated structure on Causeway Street/Lomasney Way and its replacement by an alternative facility in the environs of North Station. For many years, the Green Line elevated structure has been perceived as a physical and environmental barrier which has contributed strongly to the deterioration of the North Station area and which has inhibited redevelopment actions. The desire to eliminate this elevated structure also has existed for a long time, but serious action on its removal did not occur due partly to a lack of serious and committed land use plans for the area and in part because of the greater attention having been given to the reconstruction of major roadway links in the general area, related to the Central Artery.

Now that a bold concept for the renewal of the North Station area has been adopted and the approval of an urban renewal plan has been obtained, the impetus for achieving a Green Line relocation exists. In fact, the BRA has concluded (as has Moshe Safdie, the Authority's consultant in preparing the renewal plan) that without such relocation, redevelopment plans would not succeed.

The North Station area Green Line relocation project involves an approximate 3,700 foot section of the Green Line between Haymarket and Science Park Station (see Figure VI.C-7). Within this section is the North Station stop, which, in addition to servicing the surrounding area, also serves as a modal transfer point for commuter rail patrons. The existing section comprises about 800 feet of transition from subway at Haymarket to elevated at North Station and approximately 2,900 feet of elevated viaduct. The line now serves about 660 light rail cars per day.

4.2 Description of Alternatives

As part of the scope for this Environmental Impact Report/Statement, the Executive Office of Environmental Affairs, in consultation with the BRA and the MBTA, identified eight Green Line relocation alternatives for consideration. These alternatives are described in detail, together with a comprehensive evaluation of their feasibility with respect to specific design determinants and of their environmental consequences, in Appendix J.

On the basis of the various assessment items and design determinants, and additional evaluation of the eight alternatives by the MBTA's consultants,* two basic options (besides the base-case no-build condition) were considered feasible and acceptable for further consideration. These options involve either a subway tunnel from Haymarket Station under North Station to a transition section linking to the elevated Science Park Station (Alternative 5C) or a new, relocated elevated alignment behind North Station (Alternative 3), the latter being very contingent upon good design and location. In addition, the Urban Mass Transportation Administration, the Federal agency which would provide most of the funds for the Green Line improvement, requested that consideration be given to a major modernization of the existing elevated line in its present alignment. The MBTA has carried forth a detailed environmental assessment of each of these alternatives in a Draft Environmental Impact Statement, and its findings are incorporated, in summary, in the appropriate sections of this document.(8)

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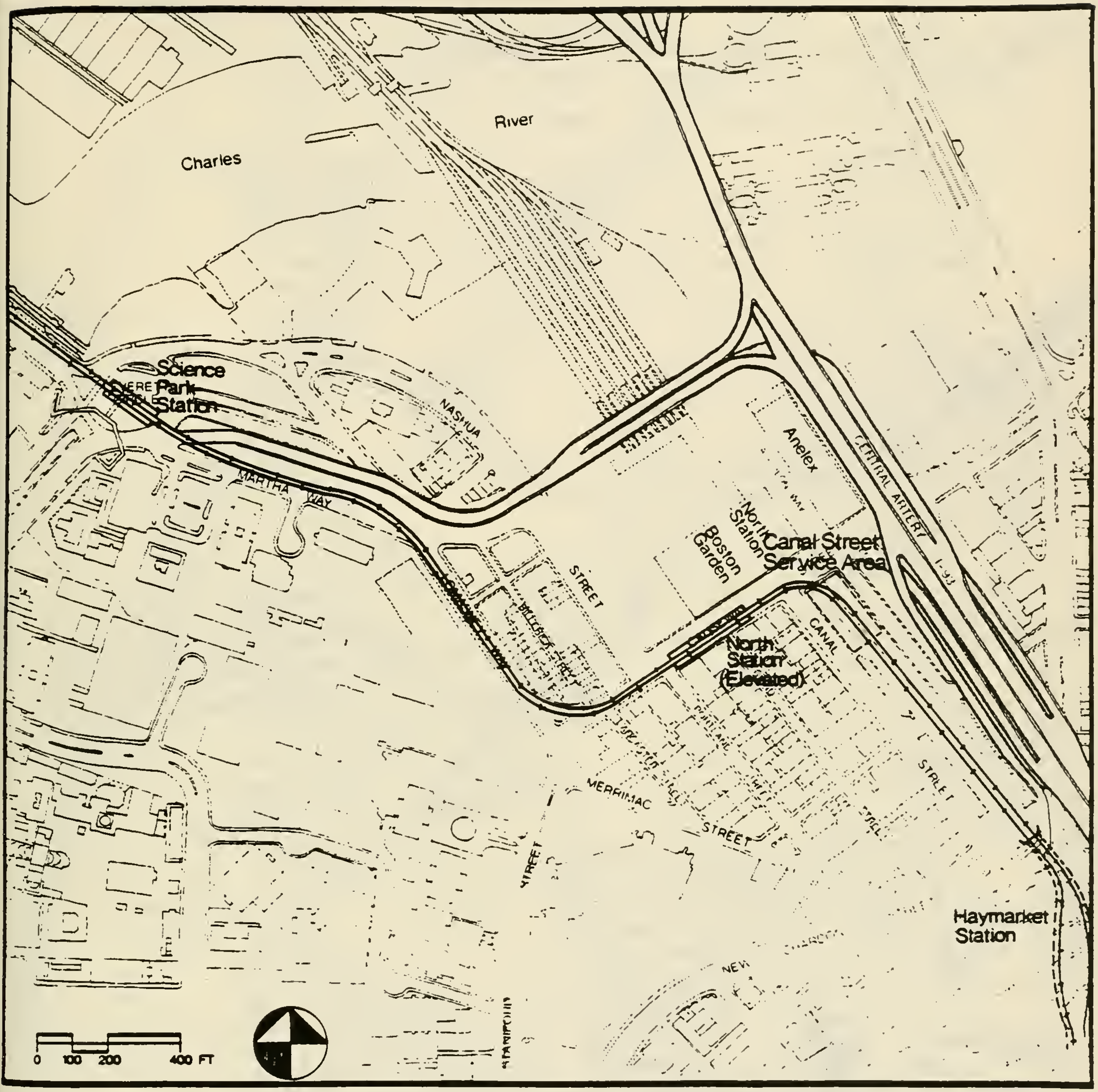
* For details of this analysis, see Massachusetts Bay Transportation Authority, Green Line North Station Preferred Alternatives Report, prepared by Charles G. Hilgenhurst & Associates, Inc., and Fay, Spofford & Thorndike, Inc., *et al*., June, 1981.

The four alternatives under study are summarized below, together with a brief analysis of their overall effects. (A summary of the advantages and disadvantages of each of the three build options, as conceived by the MBTA, is presented in Appendix K.)

(1) No Build (Figure VI.C-7) - This alternative - the no action base condition - would maintain the status quo relative to the existing Green Line transit facilities and services. Modifications to the present station entrances and platform areas would be limited to minor refurbishing, waterproofing, and structural maintenance.

This alternative would be inconsistent with and detrimental to the overall revitalization efforts in the North Station area. The blighting effect of the present structure would continue, seriously degrading the environment of the new Federal Office Building, the construction of which, however, probably would still proceed. Significantly more noise would be generated than with any of the other alternatives, and pollutants would continue to be trapped on surface streets beneath the structure. The only advantages of the no-build option would be its minimal cost and the lack of substantial construction impacts. However, the cost savings to the MBTA would be tempered by increased annual maintenance costs of the over 70-year old structure and lost passenger revenue due to the retardation effects of this option on North Station area redevelopment and continuation of lengthy transfers between the commuter rail facilities and the Green Line.

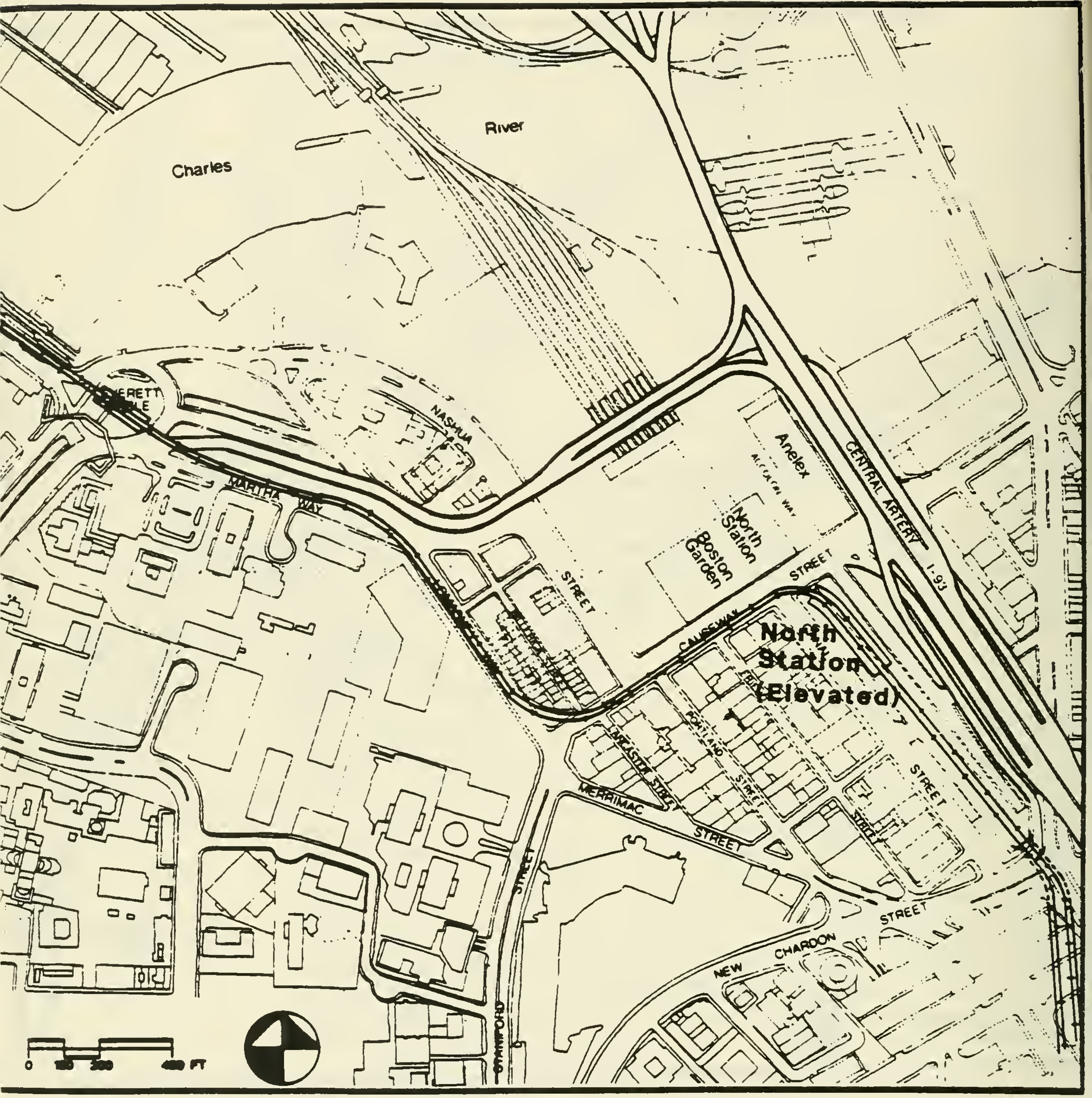
(2) Modernization of Existing Elevated (Refurbished Base Case) (Figure VI.C-8) - This option would provide for the upgrading of and improvements to the existing North Station Green Line facilities while essentially retaining the existing alignment. Included in the proposals would be the relocation of the station to a new center-loaded island platform above the existing Canal Street facilities; removal of the abandoned platforms and excess non-load bearing structure over Causeway



Ⓣ *Massachusetts Bay Transportation Authority*

GREEN LINE RELOCATION
ALTERNATIVE 1: NO-ACTION

Figure VI.C-7



Ⓣ *Massachusetts Bay Transportation Authority*

GREEN LINE RELOCATION

ALTERNATIVE 1A: REFURBISHED BASE CASE

Figure VI.C-8

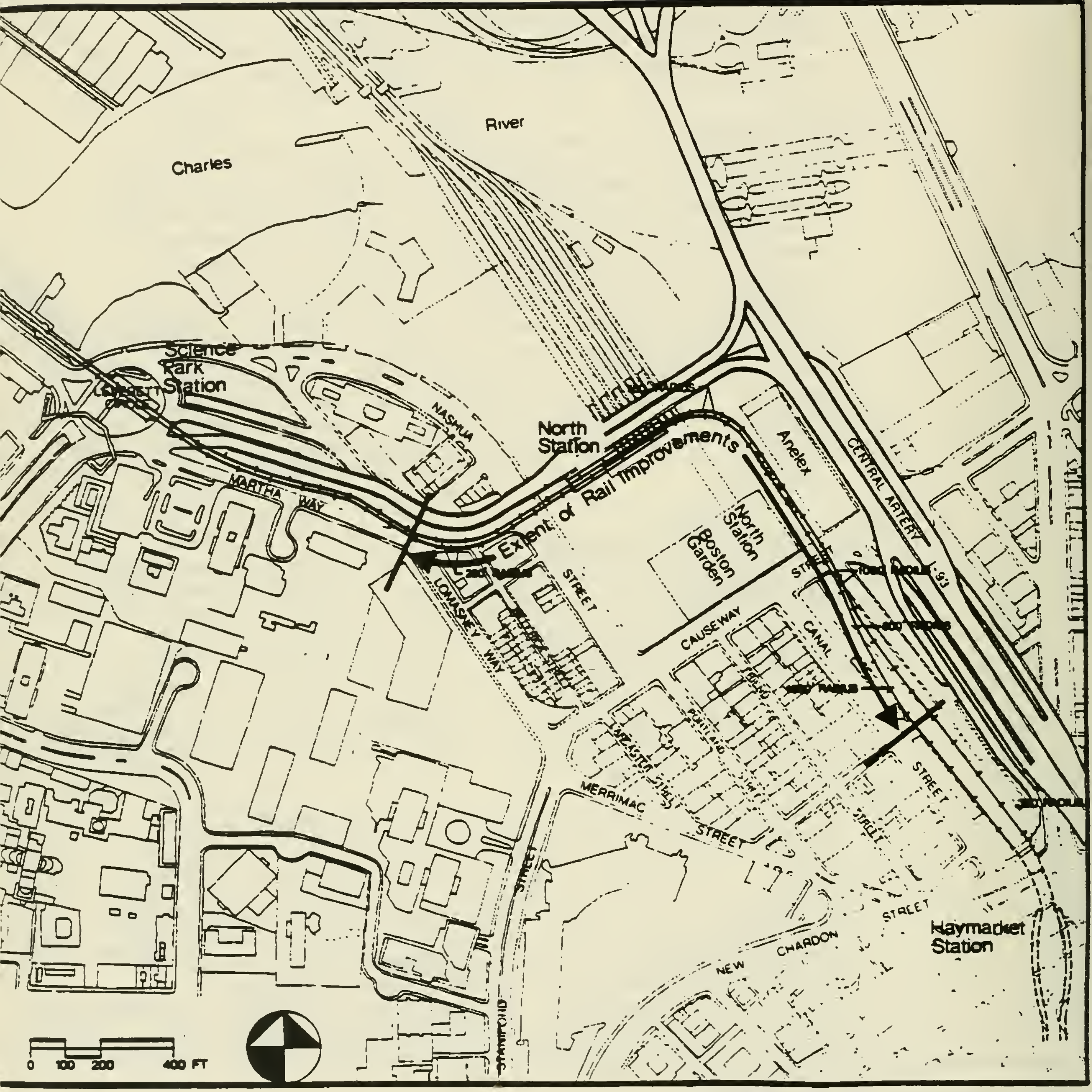
Street; noise attenuation improvements such as continuous welded rail, new noise-dampening resilient rail fasteners, ballast and ballast mats, and acoustical treatment under the elevated structure; and new train signalization equipment.

Like the no-build alternative, this option, although resulting in a substantially improved facility, would still retain the elevated over Causeway Street and Lomasney Way and reduce the redevelopment potential of the area, although the GSA building probably would be constructed. Noise levels would be abated somewhat because of the attenuation measures, but the air quality on the streets below the elevated would continue to be adversely affected. In addition, there would be substantial disruption of existing transit service in order to implement a modernization program, requiring a shutting down of service during the construction period and an extended period of temporary bus service replacement. The costs of this option would be considerably less than those of the build options, but projected transit ridership, and the passenger revenue, would be nearly the same as the no-build alternative, for the same reasons.

(3) Elevated on New Alignment (Figure VI.C-9) - The relocated elevated alternative involves the construction of a new, modern elevated structure via Accolon Way and behind North Station, tying into the existing Green Line facilities in the vicinity of Haymarket Station (with a transition section) and to the south of Science Park Station. A two-level platform area/ station would be built above the commuter rail facilities and could be incorporated into the new arena building itself, thus providing excellent intermodal transfer capabilities as well as access to the other elements of the redevelopment project (see Figure VI.K-1 infra).

This alternative, the least expensive of the build options (estimated at $45 million), could be constructed almost entirely within public rights-of-way, thus avoiding costly property acquisition or relocation requirements. Its alignment behind North Station would stay at the periphery of the Phase I development parcels and could be readily integrated into the proposed new arena and parking structure (unless sensitively designed and incorporated into the proposed development, it would have the potential to be a blighting influence on the surrounding environment). This option would involve minimal disruption of Green Line service during construction in order to connect with the existing alignments.

The elevated alternative would generate more noise than the subway option, although continuous welded rail technology, use of resilient rail fasteners, improved maintenance practices, and noise buffers could make the new elevated structure nearly as quiet as existing at-grade transit operations. In addition, locating the new alignment adjacent to an existing noise generator (the connector ramps) and its incorporation into the development would further help to minimize noise impact.



Massachusetts Bay Transportation Authority

GREEN LINE RELOCATION

ALTERNATIVE 3: ELEVATED ON NEW ALIGNMENT

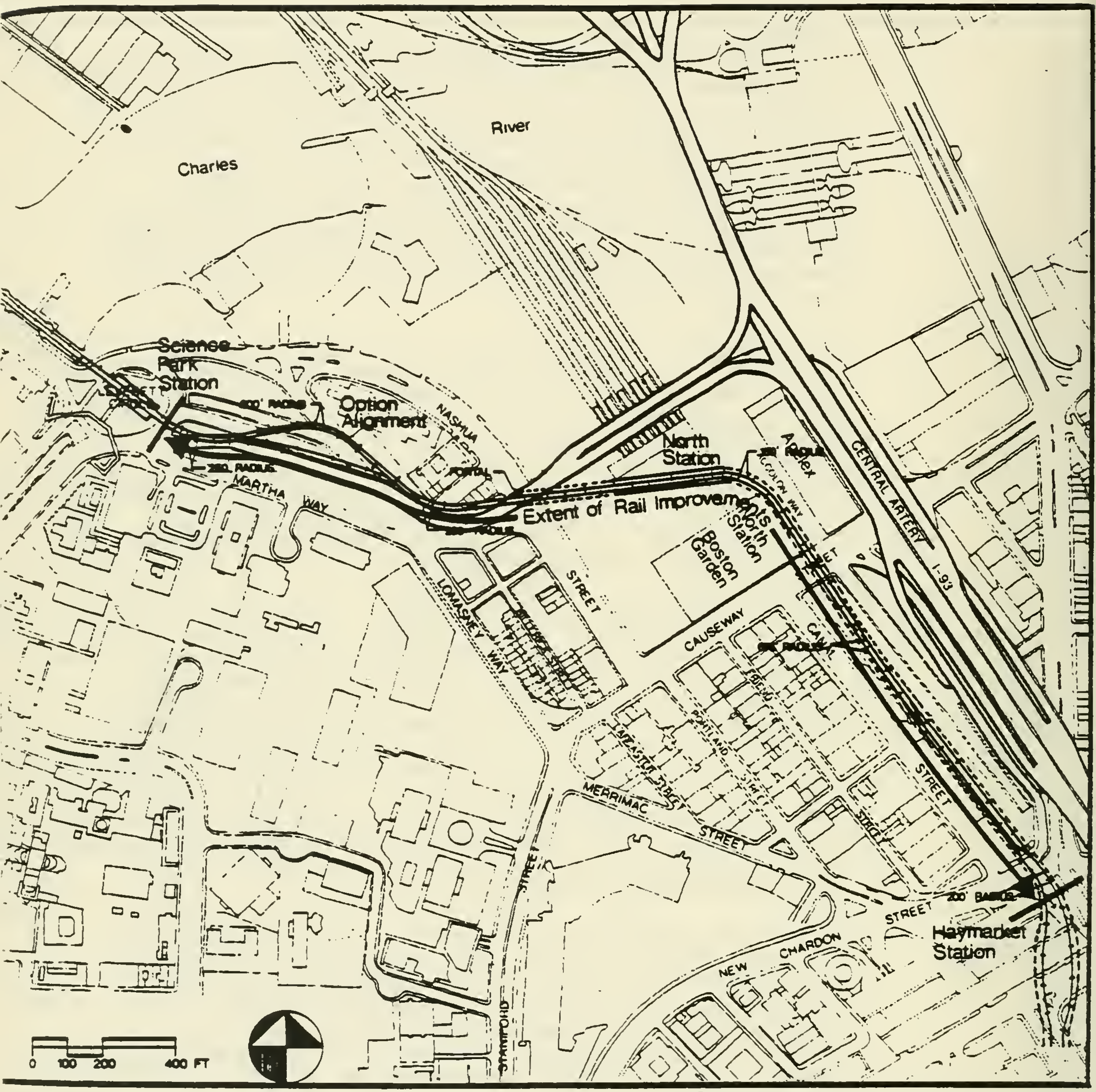
Figure VI.C-9

Although the transition from subway to elevated profile would occur south of Causeway Street, between the Haymarket exit ramp from the Central Artery and the existing subway-to-elevated transition zone along Canal Street, thereby avoiding the creation of a new barrier, this alternative would maintain the elevated structure on the south side of the Storrow Drive Connector ramps opposite Charles River Park. Moreover, existing elevated connections between the Boston Garden and the Analex Building would have to be removed and temporary substitution connection provided, while existing fire escapes along the easterly side of the Garden and utility connections also might be adversely affected.

Upon completion of the new facility, the existing elevated structure to be abandoned could be removed. Demolition activities, however, could result in disruptions to vehicular and pedestrian movements in the area and would need to be conducted in a manner which would minimize this disruption to the greatest extent possible. Removal operations should be scheduled for periods when vehicular and pedestrian traffic in the area is minimal. Also, the demolition must be coordinated with, and proceed, the BRA's proposed roadway improvements to Causeway Street and Lomasney Way.

(4) Subway on New Alignment (Figure VI.C-10) - The subway alternative would provide a new subway alignment, beginning at Haymarket Station, parallel to the Orange Line tunnel, extending under the easterly end of the North Station/Boston Garden building, and rising in a transition section just beyond the Storrow Drive Connector ramps to join the elevated Science Park Station. A two-level station would be constructed with direct interconnection with the commuter rail terminal above. Under this alternative, the existing Green Line facilities at Canal Street would be discontinued and would be relocated to the new subway station, which would be provided with a double-island platform configuration to accommodate both through trips and trips terminating at North Station.

As with the relocated elevated option, the subway alternative would provide for convenient pedestrian access to the commuter rail platforms and to the proposed North Station area redevelopment parcels. Since the alignment would remain in a subway profile until it passed beneath the Storrow Drive Connector ramps, it would not inhibit currently proposed Phase I and Phase II street improvements or development plans. In addition, the transition zone from subway to elevated would be further removed, in this option, from Charles River Park, permitting removal of the existing elevated structure along Martha Road, but at the same time it would extend the elevated into the park/promenade area along the proposed new canal. Moreover, this alternative could provide for a future subway extension below the Charles River to Cambridge, should this be



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GREEN LINE RELOCATION

ALTERNATIVE 5C: SUBWAY ON NEW ALIGNMENT

Figure VI.C-10

desired. Visually, the subway option would represent a significant improvement over the existing elevated structure. However, a new barrier would be created from the subway portal to Lomasney Way.

The major disadvantage of this alternative would be its high cost (estimated at $93 million), due to extremely costly foundation restructuring and underpining of the Boston Garden building, modifications to the columns and bents supporting the Storrow Drive Connector ramps, and underpining and other structural work of this structure. The transition section would require the dislocation of the MDPW motor pool facility on Nashua Street and probably the present unused brine/ice plant addition to the Boston Edison steam generating facility on Minot Street. Serious conflicts also would occur with the Phase I access road, which must tunnel beneath the commuter rail tracks, and with the Combined Sewer Overflow main, which will remain in the Nashua Street right-of-way. Construction-wise, this alternative would be more disruptive than the elevated relocation option, but probably less so than the modernization option, and would require the most energy consumption of any of the alternatives. Finally, future roadway proposals would require that the transition zone have grades nearing 7% (exceeding the MBTA maximum desirable gradient of 5%), which could adversely affect transit operations, unless the Science Park Station were relocated several hundred feet to the north to permit a lesser gradient.

Demolition of the existing elevated sections would have the same effects and require the same precautions as in the relocated elevated option.

4.3 Transportation-Related Impacts

Transit Service and Ridership

Both of the relocation options would be expected to have the same transit service impacts:

(1) Increased transit ridership at North Station due to improved transit facilities and greatly increased development in the area;

(2) Increased service requirements due to this increase in ridership; and

(3) Decreased passenger transfer time between the Green Line and commuter rail services.

Ridership projections were derived by the MBTA from analysis by the Central Transportation Planning Staff (CTPS), based on the BRA year 1987 Phase 1 development and year 2000 Phase II preferred and optional developments.(9) With implementation of the renewal project proposals, some of the employees, residents, and visitors associated with the new North Station development would be expected to use the Green Line for trips to and from the area (for modal split assumptions for public transit, see Section 1.3 above).* In addition, replacement of the Green Line also would be expected to increase ridership due to more convenient access. The No-build alternative, on the other hand, would have little impact on the provision of transit service and would not be expected to result in any major growth in ridership, since it would be detrimental to new development in the area. The total projected average daily boardings for the four alternatives are given in Table VI.C-17 below.

Table VI.C-17

Transit Ridership Projections
Green Line Boardings at North Station*

	No-Build**		Upgrading**		Subway/ Relocated Elevated	
Year	Boardings	% Increase	Boardings	% Increase	Boardings	% Increase
1980 (existing)	3,700		N.A.	N.A.	N.A.	N.A.
1987	4,500	21.6	4,550	23.0	6,700	81.1
2000 (Preferred)	4,800	6.7	4,900	7.7	8,400	25.4
2000 (Optional)	4,800	6.7	4,900	7.7	8,000	19.4

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* Assumes no change in transit service market area.

** Projections assume construction of the GSA Building and continuation of existing land uses and trends in the project area with no other new development.

Source: U.S. Department of Transportation, Urban Mass Transportation Administration, Draft Environmental Impact Statement - Boston Green Line Improvements at North Station, August, 1982, Table 12.

The substantial increase in projected ridership under the build alternatives would necessitate increases in transit vehicle frequency at North Station to accommodate the new riders. These projected service frequency increases are summarized in Table VI.C-18. These increases would result in increased service levels as well, since the higher frequency of trains would reduce headways and decrease wait-time for North Station boarders.

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* It is estimated by CTPS that 55% of the transit ridership generated by the North Station redevelopment would use the Green Line and 45% the Orange Line.

TABLE VI.C-18

ADDITIONAL TRANSIT LIGHT RAIL VEHICLE TRIPS NEEDED TO SERVICE INCREASED RIDERSHIP

Phase I
(1987)

	Lechmere/North Station	North Station/Park Street
6AM to 7AM	1	2
7AM to 9AM	1	11
9AM to 4PM	4	21
4PM to 6PM	1	8
6PM to 12PM	1	7
TOTAL WEEKDAY	8	49

Phase II - Preferred
(2000)

	Lechmere/North Station	North Station/Park Street
6AM to 7AM	1	2
7AM to 9AM	1	17
9AM to 4PM	6	31
4PM to 6PM	2	12
6PM to 12PM	2	10
TOTAL WEEKDAY	12	72

Phase II - Optional
(2000)

	Lechmere/North Station	North Station/Park Street
6AM to 7AM	1	2
7AM to 9AM	1	15
9AM to 4PM	5	28
4PM to 6PM	2	11
6PM to 12PM	2	9
TOTAL WEEKDAY	11	65

Source: U.S. Department of Transportation, Urban Mass Transportation Administration, Draft Environmental Impact Statement - Boston Green Line Improvements at North Station, August 1982, Table 16.

Roadway/Vehicular Circulation

For the build alternatives, impacts on vehicular circulation would occur principally during the construction period due to the construction activities in the vicinity of existing roadways. The significance of the impacts, however, are likely to be more extensive with the subway option because construction activities for an elevated structure would be less obstructive than cut-and-cover excavation and subway construction. Construction activities would necessitate complete or partial closings of roadways and short-term rechanneling of traffic in the area, resulting in potential traffic delays as motorists use optional routes, including streets within the Bulfinch Triangle Area, to traverse the area. Temporary detour routes to serve existing properties and parking lots also would be necessary. Following construction, neither build alternative would have any long-term adverse traffic circulation impacts.

There are, however, a number of potential conflicts between the subway alternative and future project area development. Under current MBTA plans, the subway alignment and station platforms would be located within the vertical alignment of the Sub-area I access road, which must descend below grade to pass beneath an MBTA proposed extension of the commuter rail tracks (see Section 5 below). In addition, the major (72" x 90") Nashua Street Combined Sewer Overflow main, located approximately 6 feet below street grade, will be retained in place. Hence the locations of both the proposed depressed access road and the CSO main would seriously hinder, if not prevent, the construction of the subway option. (If the commuter rail tracks are not extended, and the Green Line maintains the same level below grade as the Orange Line alignment, a conflict with the roadway might be avoided, but the conflicts with the CSO main would nonetheless remain.) Unless the sewer line were relocated, the subway would have to pass beneath the main, making the grade to the elevated section at Science Park unacceptably steep. Review of existing plans indicate that there probably would not be sufficient vertical clearance to allow construction of a subway section between the base of the descending access roadway and the top of the sewer main.

A second potential conflict involves the future of the northern part of Nashua Street, which present renewal plans propose for discontinuance. The subway portal, as presently designed, would be located within the existing right-of-way of Nashua Street. (It should be noted that the MBTA's proposals were developed in conjunction with the BRA's redevelopment plans for the area, and that the discontinuance of Nashua Street was assumed as a future given condition.) However, if the northern portion of Nashua Street were to remain, the portal area of the subway could be relocated slightly to permit a continuation, or slight realignment, of Nashua Street. According to the MBTA, their plans have an inherent flexibility to accommodate either the future BRA roadway proposal or a modified existing roadway configuration. This would, of course, require close coordination between the two agencies as plans are more firmly determined.

Neither the no-build nor the upgrading alternatives would directly affect future roadway circulation. Although continued existence of the elevated structure above Causeway Street and Lomasney Way would inhibit any future reconstruction of these streets, these improvements would be unlikely to occur unless substantial new development also were to happen. Some short-term disruption of traffic circulation and possibly temporary detours would be expected to result from any maintenance or reconstruction activities, particularly with the refurbished base case. However, disruption to vehicular circulation could be minimized by limiting demolition activities to late evening hours when traffic demands would be the lowest.

Pedestrian Circulation

In both build alternatives, station location and access easements have been designed to integrate into the existing and proposed pedestrian circulation paths. The primary linkage would be to the permanent pedestrian easement connecting Causeway Street (at Canal Street) to the proposed Green Line station and, ultimately, to the Phase II development area. Secondary pedestrian access would include a direct and convenient connection between the Green Line and the commuter rail facilities, a connection to proposed bus service and bus-and-ride areas, and a linkage to the Federal Office Building for the convenience of Federal employees who would utilize the Green Line and commuter rail facilities. These three secondary paths would interconnect with the primary pedestrian easement to allow easy access to all facilities in Sub-area I (as well as to the later stage of development). The circulation proposals would be especially designed to facilitate intermodal transfers and to link the transit and rail passengers to destinations within the district and beyond.

Under the No-build alternative, pedestrian circulation in the area would not change and would be considerably less efficient and convenient than with either of the relocation alternatives. Most adversely affected would be those pedestrians transferring between the Green Line transit station and the commuter rail line, since they would have the same poor connection as at present. Pedestrian circulation and access would be improved with the upgrading alternative, since the proposed relocation of the elevated platform would facilitate transfers between the elevated Green Line and the Canal Street platforms and would permit an escalator access from the Canal Street service area to the elevated platform. These improvements, however, would only benefit passengers who board or alight on the elevated platforms.

5. Commuter Rail Improvements

Under its North Station Transit Improvements Program, the MBTA also has been studying proposals to improve the commuter rail (and Orange Line) facilities at North Station. Although the specific environmental impact of these proposals are outside the scope of the EIR/EIS,* the relationship and compatibility of the MBTA plans to the area's redevelopment plans can be examined. Among the proposed improvements are:

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* A more detailed discussion of the proposed commuter rail improvements and their impacts will be included in a Supplementary Draft EIS on transportation improvements at North Station, to be published by the MBTA.

(1) Platform and track lengthening to increase the existing 6-7 car train capacity to 9-12 car train capacity.

(2) Construction of new high-level platforms to provide easy passenger flow.

(3) Construction of a new commuter rail ticketing and waiting area to replace the existing facilities at North Station.

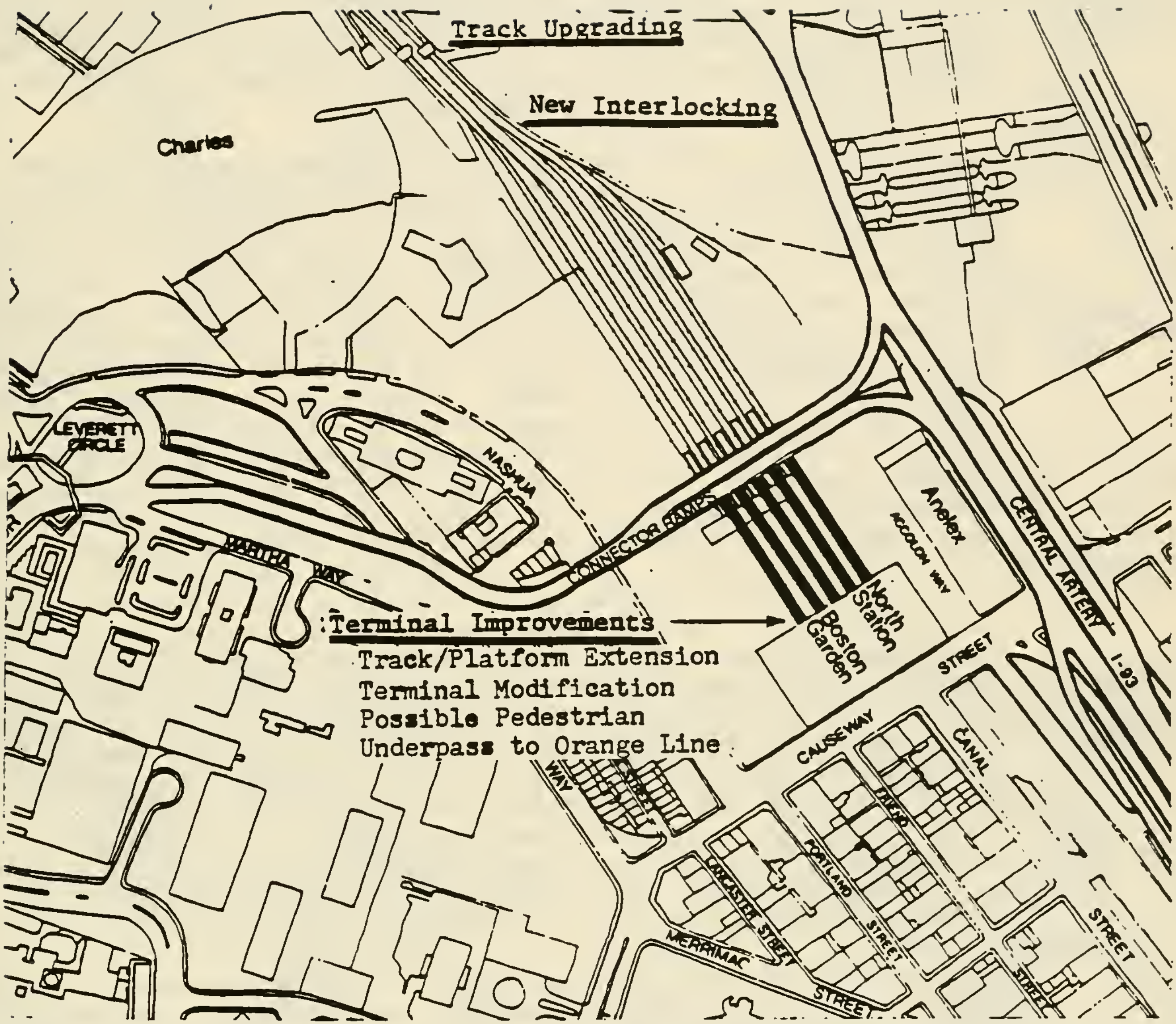
(4) Construction of a new underground pedestrian connection between the Orange Line and the commuter rail waiting area.

In addition, the Urban Renewal Plan proposes the decking over of the track area from North Station to the outer edge of the proposed island with air rights development, pedestrian and vehicular access, and open space on the surface and with the installation of the necessary ventilation system. (The principal impact of this proposal relates to air quality, which is considered in detail in Section H of this Part.)

According to the MBTA,(10) the commuter rail terminal has enough tracks (ten) but these tracks are not long enough to accommodate the longer trains needed to expand system capacity while at the same time achieve maximum efficiency in commuter rail operations. Currently, nearly six million railroad passengers use North Station annually. With completion of the Orange Line relocation to the Back Bay, enabling passengers to have a direct access to the Back Bay area and to Amtrak service, the MBTA expects that North Station could experience a dramatic growth in railroad passengers carried into Boston, even without considering the impact of the redevelopment of the North Station area. MBTA estimates for the year 2000 project a doubling of the number of passengers served by the commuter rail annually, to 12.4 million.(11)

In order to accommodate this increase at maximum efficiency, the present 6-7 car trains, according to the MBTA, should be expanded to 9-12 car trains (during rush hours). The addition of a greater number of shorter trains is not considered economical since the locomotive is the most costly item and currently is capable of hauling several more coaches. Consequently, the MBTA has proposed extending the tracks approximately 300 feet southerly beyond their present terminus and reconstructing the platform area to provide 1,000-foot high-level platforms and canopies. Other improvements proposed include a simplified interlocking to improve train movements in and out of the terminal, modifications to the track layout north of Draw 1, and physical improvements to Draw 1 over the Charles River (Figure VI.C-11).

The present redevelopment plan does not provide for any extension of the tracks but rather maintains them at their present terminus under the Storrow Drive Connector ramps. Thus, the MBTA proposal is unconsistent with the currently-proposed Arena plans, which do not accommodate the longer trains desired by the Transportation Authority. Nonetheless, the tracks could be extended directly under the Arena (current structural plans do not foreclose this option since the Arena would be raised some



Track Upgrading

New Interlocking

Terminal Improvements

Track/Platform Extension
Terminal Modification
Possible Pedestrian
Underpass to Orange Line

Massachusetts Bay Transportation Authority

North Station Commuter Rail Improvements

Figure VI.C-11

30 feet above grade to accommodate a two-level parking garage), an option which, however, would eliminate this parking and reduce the project area's future parking supply by 500 spaces. This loss in parking would adversely affect the project, since it would increase the projected deficiency of on-site parking for Arena events.

Extension of the tracks would not have an adverse impact on the feasibility of the proposed Sub-area I access road, since this road would be tunneled beneath the station area in any case. With the tracks extended, the access road would require a maximum depth of 18.5 feet to 23 feet, depending on whether passenger vehicles only or all vehicles are to be allowed. Were the tracks not extended and the access road need only to pass beneath the platform area, a maximum depth below grade of 10.5 feet to 15 feet would be required. According the the aforementioned engineering study of the access roadway, prepared for the BRA (1), implementation of the access road as proposed would still be feasible even if the tracks were extended, although the grade necessary to accommodate the required clearances, design speed, and other controls (12%) would be the maximum allowable (under the all vehicle option) and, as further noted, a direct connection to Accolon Way would not be possible.

As part of the reconstruction of this facility, the MBTA also is studying the construction of an underground pedestrian connection to the Orange Line subway station at Canal Street. This connection also would facilitate transfers between the Orange Line and the relocated Green Line station, thus providing for efficient intermodal transfers between the two transit lines serving the North Station area and the commuter rail facilities. The connection itself would be tunneled under Causeway Street and would come up at the new commuter rail waiting area, with a direct connection to the new Green Line Station, either subway or elevated. (It should be noted that improved transfer capability could not be provided if UMTA/MBTA ultimately choose the upgrading of the existing alignment option for the Green Line.)

Peripherally related to the commuter rail facility improvements is the possibility of a light-rail connection from North Station to the USS Constitution National Historic Park at the Charlestown Navy Yard (as well as the BRA's Navy Yard redevelopment project). The feasibility of such a connection, and the availability of a suitable right-of-way, would require considerably more detailed study on the part of the MBTA as part of its commuter rail improvements program. The North Station redevelopment proposals, however, would not specifically foreclose the possibility of this connection, should it be found to be desirable and feasible.

6. Storrow Drive Connector Relocation

The Massachusetts Department of Public Works has had under study the possibility of a future improvement of the Central Artery - Leverett Circle link, presently accommodated by the Storrow Drive Connector ramps behind North Station. Louis Berger and Associates, Inc., under contract with the Department, studied the feasibility of four alternative schemes for improving this connection.(12) The four alternatives are briefly described below and are illustrated in Figure VI.C-12.

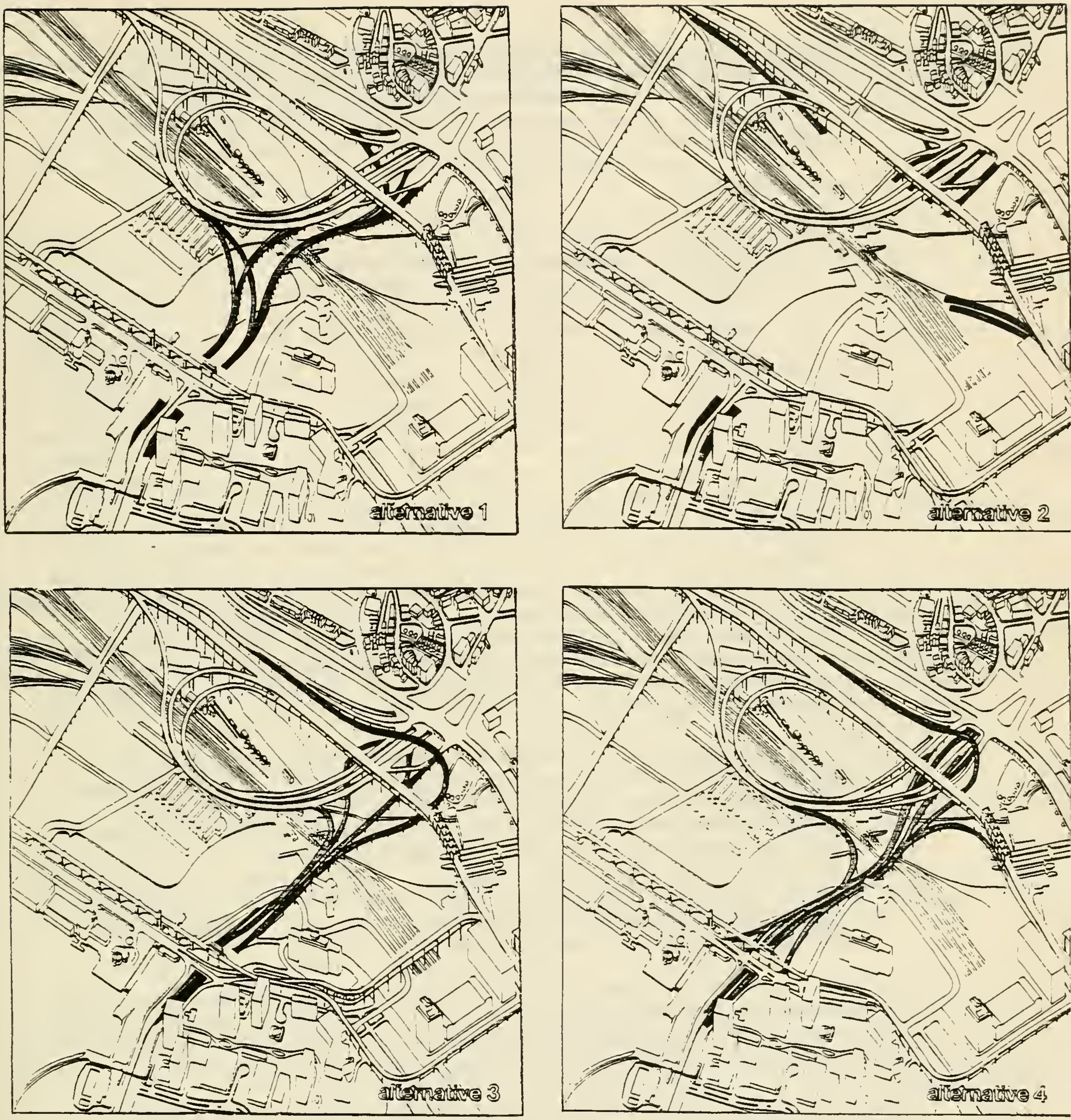


Figure VI.C-12: STORROW DRIVE CONNECTOR RAMPS RELOCATION
MASSACHUSETTS D.P.W. ALTERNATIVES

Source: Louis Berger and Assoc, Inc., Central Artery-Leverett Circle Connection Feasibility Study, prepared for Commonwealth of Massachusetts, Executive Office of Transportation and Construction, Department of Public Works, May 1981.

1. Alternative 1: This alternative connects Leverett Circle to the North Area Project (Charlestown) by a series of bridges which criss-cross the Charles River at various levels. The connection from Storrow Drive passes under Leverett Circle in a new tunnel before ascending onto bridges over the River and the commuter rail tracks. Leverett Circle would be replaced by a signalized "T" intersection.

2. Alternative 2: Alternative 2 connects Leverett Circle to the North Area Project by means of two tunnels under the Charles River. These tunnels pass under Leverett Circle (which would be replaced by a signalized "T" intersection), continue under the river and the rail tracks, and ascend over the MBTA Orange Line to connect to the City Square tunnels. The tunnels are kept below the boat channel to avoid the need to relocate the channel. A direct Storrow Drive to Central Artery connection is provided via tunnels from Leverett Circle which ascend east of the commuter rail yard to connect to the existing Central Artery ramps. Some filling of the river channel along the south bank is necessary to accommodate this connection.

3. Alternative 3: Like Alternative 1, this alternative also connects Leverett Circle to the North Area by two parallel bridges which follow the southerly bank of the Charles River. The Storrow Drive connection passes under Leverett Circle in a tunnel prior to ascending to the proposed bridges, which cross the River just east of the railroad bridges. This alternative maintains the existing double ramp structure behind North Station. The Leverett Circle rotary is replaced by a modified "T" intersection, although a signalized "T" intersection could be substituted.

4. Alternative 4: This alternative connects Leverett Circle to the North Area Project by parallel bridge structures similar to those proposed for Alternative 3. However, a new bridge connection replaces the existing ramp connection between Storrow Drive and the Central Artery and the Route 1 southbound connection is realigned to straighten and improve the geometry. Also, unlike the other alternatives, the Leverett Circle rotary is replaced by a full "diamond" type interchange which provides for all traffic movements between the expressways and local streets.

As noted in Park IV.G above, the consultant's study recommended that the DPW pursue the tunnel option (Alternative 2). However, due to the more recent Central Artery depression proposal, the Department has deferred any further study on the Connector relocation project.

With respect to the traffic and circulation impacts of the proposed Leverett Circle/Storrow Drive Connector improvements, all the alternatives would cause some increase of average weekday traffic (AWDT) volume along I-93 North, Tobin Bridge/Route 1, and Storrow Drive and a decrease in the Central Artery and the I-93/Charles River Bridge. However, each alternative would affect these increases and decreases differently;

Alternative 1, for example, would provide the greatest decrease on the Central Artery while Alternative 4 would result in the greatest increase on the Tobin Bridge. A summary of the four alternatives is included in Table VI.C-19 below.

Table VI.C-19

Estimated Percentage Change in AWDT - Leverett Circle Improvements

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
I-93 North	+ 8.4	+ 9.7	+ 5.9	+ 9.3
Tobin Bridge	+ 0.2	+ 1.5	+ 4.5	+ 5.8
Storrow Drive	+11.1	+13.3	+ 4.3	+ 6.5
Central Artery	-14.8	- 7.3	- 0.7	- 4.7
Charles River Bridge	-15.5	-21.8	-27.4	-16.7

Source: Louis Berger and Associates, Inc., Central Artery Leverett Circle Connection Feasibility Study, May, 1981.

Only Alternative 4 would provide a direct access between Msgr. O'Brien Highway and the North Station area and the expressway system, by means of a full diamond interchange at Leverett Circle. Consequently, high volumes of traffic would have to use the connection between Leverett Circle and the North Area, resulting in difficult operations due to short weaving distances between ramps. The lack of a direct access under the other alternatives, however, could result in an increase in traffic on local streets around the North Station project area. In addition both Alternatives 1 and 4 would require that traffic travelling between Storrow Drive and the Central Artery follow a long and circuitous route; in the case of Alternative 1, this traffic would have to cross the river twice (unless the existing connector ramps were retained).

Moreover, each of the alternatives also would result in poor operating conditions due to such problems as difficult weave sections, sharp vertical or horizontal curves, unconventional traffic moves, and short merging and decision-making distances.

The other impacts of these alternatives are described in the appropriate sections of this Part. It should be emphasized, however, that any of the three bridge schemes, and to a much lesser extent, the tunnel scheme, would seriously conflict with the proposed development of the residential island and the canal in Phase II of the BRA's redevelopment project, since bridge sections, ramps, and tunnels would be constructed within the area proposed for these developments.

7. Central Artery Depression

In conjunction with a proposal to build a Third Harbor Tunnel, the Massachusetts DPW also has evaluated a plan to widen and depress in a tunnel section the Central ARtery through downtown Boston. This undertaking, as it affects the North Station project area, has been described in Part IV.G supra. A number of alternative alignments for the Third Harbor Tunnel, as well as a proposal to depress and widen the Artery without the Tunnel, have been examined; however, only the preferred alternative (5A modified) is considered in this document. (For a detailed decision of the other alternatives, see the Supplement to the Draft EIS/EIR for the Third Harbor Tunnel/Central Artery.(13)) The Central Artery depression scheme would remain the same regardless of which Harbor Tunnel alignment ultimately is selected, but some traffic impacts would vary somewhat according to the alternative due to different redistributions of traffic, with the options including a new Harbor Tunnel being more favorable than the option which only depresses the Artery (Alternative 6).

With respect to traffic and circulation, the Artery depression proposal would have several impacts on the North Station area:

(1) The improved capacity of the Central Artery as a result of its widening, which in turn would reduce travel time and queuing, would make alternative Charles River crossings such as the North Washington Street bridge less desirable to motorists. This diversion of traffic would significantly reduce congestion at Keany Square, with consequent air quality benefits as well (see Part VI.H.2.3).

(2) The provision of a northbound on-ramp to the Central Artery from Causeway Street likewise would reduce traffic at Keany Square and on the North Washington Street bridge. According to the Supplement to the Draft EIS/EIR, it is estimated that daily traffic volume on the bridge would be nearly 35% less than would occur were the Artery not depressed. At Keany Square, by the year 2010, A.M. peak-hour volumes are projected to be reduced by 25% over a no-build and P.M. peak-hour volumes by 12%; levels-of-service, however, while improving from F to C at the A.M. peak, would remain at F during the P.M. peak.

(3) At Leverett Circle, A.M. peak-hour volumes are predicted to decrease by 6% in both 1990 and 2010 over a no-build situation, with a slight improvement in level-of-service (from E to D) by 2010; but P.M. peak-hour volumes would increase significantly by 17%, over the no-build in 2010, and the level-of-service would deteriorate from D to E.

(4) Traffic on Causeway Street also is projected to be reduced over a no-build by 44% in 1990 and 46% in 2010. However, traffic on other peripheral streets, such as Merrimac Street, could be increased somewhat.

(5) Access to the North Station area from the north would improve due to a new ramp at Causeway Street. Access from the south, however, would become less direct because of the removal of the existing Causeway Street ramp, requiring northbound traffic to use a new surface artery and local streets.

(6) Service access to the proposed Arena would be eliminated by the transition zone of the Central Artery from depressed tunnels to elevated bridges between Causeway Street and the Charles River. Beverly Street also would be closed, which would prevent construction of the proposed Sub-area I access/service road.

(As noted previously, the Central Artery depression proposal, as presently conceived, would seriously interfere with the BRA's development plans for the Phase II area and in all probability would prevent their implementation.)

D. Public Utilities and Services

1. Water

At the present time, the North Station project area has an estimated maximum average daily water demand of 258,355 gallons (assuming a full capacity Garden event).* With completion and full utilization of the North Station development, a maximum average daily water consumption of 838,160 gallons is estimated (806,410 gallons with the hotel option in Phase I).** Maximum daily demand is calculated at 150-200% of average daily demand, with a peak daily demand of 300% of average. Since the City of Boston, in 1980, utilized an average daily demand of 135.243 million gallons, the North Station development would increase total City demand by 0.43% (0.41% for the hotel option).

Under the optional development program, average daily water consumption is estimated at 742,700 gallons (710,950 gallons with the hotel option in Phase I), or approximately 88% of the preferred program demand.

Phase I development activities will result in an average daily water demand of 381,225 gallons with the office development option or 349,475 gallons with the hotel development option (existing development in the Phase II area would continue to require the current estimate of 108,270 gallons per day). Under Phase II development, the preferred program would require an estimated 456,935 gallons of water per day average, while the reduced-scale option would require 361,475 gallons (Table VI.D-1).

In order to implement Phase I site assembly, Nashua Street will be discontinued from Causeway Street to Minot Street, and it is expected to be necessary to remove most utilities from this segment of the roadway. As part of the site preparation work, a temporary link between the water lines in Lomasney Way and Nashua Street through Minot Street will be required to serve existing buildings in the Phase II area, before discontinuing the existing 10-inch low service water main in this portion of Nashua Street. Water service therefore will be maintained during site work except during a few hours when the final changeover is made to the new lines. The eight-inch low service line in Billerica Street also will be discontinued to clear this site for development. In the Phase II development area, all existing lines except those within the peripheral streets would be abandoned to permit development to occur, and new water lines of

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* In addition, the Boston Edison steam plant uses approximately 2.04 million gallons per year, the usage being concentrated during the winter peak loading period.

** For the basis of this estimate, see Appendix L-1.

Table VI.D-1

ESTIMATES OF AVERAGE DAILY WATER CONSUMPTION

	Average Daily Consumption*	
	Preferred Program (gallons)	Optional Program (gallons)
Phase I Development Area		
Office development option	381,225	381,225
Hotel development option	349,475	349,475
Phase II Development Area	456,935	361,475
Total Project Area		
Phase I office dev. option	838,160	742,700
Phase I hotel dev. option	806,410	710,950
Maximum Daily Demand (200% of average)		
Phase I office dev. option	1,676,320	1,485,400
Phase I hotel dev. option	1,612,820	1,421,900
Peak Daily Demand (300% of average)		
Phase I office dev. option	2,514,480	2,228,100
Phase I hotel dev. option	2,419,230	2,132,850

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*Assumes full occupancy arena event

Source: Appendix L-2

adequate capacity would be constructed within the proposed rights-of-way to serve the new development. The Boston Water and Sewer Commission has reviewed the current plans for the North Station area development and has concluded, on the basis of recent flow information, that the existing low service system serving the area could adequately supply the water requirements of the proposed project. However, no recent flow information is available regarding the high service system (Appendix L-3). Recently, the Commission completed the cleaning and cement lining of the major service mains in the area.

With respect to the regional water supply system, the Massachusetts Water Supply Policy Study (1) has estimated Boston's safe yield to be 141.7 MGD. The City's current (1980) consumption of 135.243 MGD, therefore, is within the estimated safe yield (the MDC system as a whole, however, is operating at about 10% above dependable safe yield). For 1990, the MWSP study projected an average daily consumption of 153.26 MGD for Boston and a maximum daily consumption of 161.01 MGD, resulting in a daily (average) deficit of 11.5 MG. The North Station project, therefore, although not a significant portion of the City's total water demand, still would add to the deficit.

In order to meet projected demands, the MDC has had under study for several years major projects to increase dependable safe yield, including the Northfield Mountain Water Supply Study, which would divert water from the Connecticut River watershed for MDC use and would yield an estimated 72 MGD, and the Miller's River Basin Project, yielding an additional 48-76 MGD. In addition, the Boston Water and Sewer Commission has made significant improvements to the City's water distribution system and has established a conservation program, including an extensive leak-detection program, which has reduced daily water demand by nearly 15 MGD since 1976.

Daily water consumption, however, can be reduced significantly by the implementation of conservation measures within the development itself. The Massachusetts State Plumbing Code now contains provisions for the use of water-efficient fixtures and water-conserving devices in the future construction of homes, offices, and other buildings, and prohibits tankless heaters in any large project. For commercial, institutional, and public and similar buildings, recycling and more effective application and use of process water can result in further savings. According to the New England Interstate Water Pollution Control Commission, (2) an effective water conservation program can be expected to reduce daily water system demand by approximately 20%.

With the no-build option, no relocation of existing water lines would be required and daily consumption would remain more or less equal to current demand.

2. Sewer and Drainage System

The sanitary sewerage to be generated by the proposed North Station development is estimated to be equal to 90 percent of the water usage, or 754,345 gallons per day average for the Preferred program (office option in Phase I), and 668,430 gallons per day average for the Optional program (725,770 gallons and 639,855 gallons respectively with the hotel option in Phase I), with a triple peak flow rate (Table VI.D-2). This discharge would be 2.8 to 3.2 times the amount of sewerage presently generated in the project area. According to the Boston Water and Sewer Commission, the existing main trunk lines for sewerage and drainage are more than adequate to service the proposed development, since those lines are at the upper end of a collection system and current flows are very low (Appendix L-3).

Since the North Station area currently is nearly totally paved or occupied with buildings, the proposed development will not add any impervious surfaces to the area and, in fact, would actually increase the amount of natural grassed and landscaped areas with proposed park development and extension of the Esplanade. This would result in increased permeation of rainfall into the ground rather than additional runoff into the storm drainage. Therefore, storm drainage flows in the future should be less than present flows and no additional burdens would be placed on the storm drainage system.

Commercial, office, institutional, and residential development involved in Phases I and II of the project will be connected to an upgraded sewerage and drainage system and to the treatment facility at Deer Island. The MDC is in the process of planning the upgrading and expansion of both the Deer Island and Nut Island primary treatment facilities to handle a flow of 586 mgd for the design year 2000. This capacity is 130 mgd greater than the MDC's current pumping capacity. Since the North Station development is to be phased over the next 15 years, during which this expansion is expected to occur, the project should not cause any significant impacts on the capacity of the system.

The renewal plan's proposal to close Nashua Street also potentially necessitates the displacement of the major drainage conduits from Nashua Street and their relocation within the project area. Small size local sewers servicing existing buildings on Billerica and Cotting Streets likewise will be abandoned for development site assembly. The 24" x 36" combined sewer conduit in Nashua Street, from Minot Street to Causeway Street, will be abandoned and replaced, if required, with a separated sewer system in the reconstructed Lomasney Way arterial.

The 72" x 90" Combined Sewer Overflow in Nashua Street presently connects from an overflow structure at the West Side interceptor in Causeway Street to the new M.D.C. Detention and Treatment Plant (Prison Point Pump Station) on the Cambridge shore via an extension of the Boston Marginal Conduit under the Charles River. As such,

Table VI.D-2

ESTIMATES OF AVERAGE DAILY SEWERAGE GENERATION

	Average Daily Generation*	
	Preferred Program (gallons)	Optional Program (gallons)
Phase I Development Area		
Office development option	343,105	343,105
Hotel development option	314,530	314,530
Phase II Development Area	411,240	325,325
Total Project Area		
Phase I office dev. option	754,345	668,430
Phase I hotel dev. option	725,770	639,855
Maximum Daily Generation (200% of average)		
Phase I office dev. option	1,508,690	1,336,860
Phase I hotel dev. option	1,451,540	1,279,710
Peak Daily Generation (300% of average)		
Phase I office dev. option	2,263,035	2,005,290
Phase I hotel dev. option	2,177,310	1,919,565

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*Based on 90% of daily water consumption demands

Source: Appendix L-2

this overflow conduit, built in 1929, will continue to have an important function in the regional drainage system. In the Spring of 1980 Camp Dresser & McKee, Inc., under contract to the Boston Water and Sewer Commission, investigated nine alternatives for this conduit in relation to proposed construction of the Federal Office Building. These alternatives ranged from retention without change if Nashua Street were kept open as a public way, retention of the present conduit (or a parallel pipe line) incorporated within the projected office building, and abandonment without replacement, to abandonment with replacement by a substitute conduit of equivalent capacity. Subsequent to this study, the BRA, GSA, and BWSC further investigated the options which appeared most feasible for implementation and concluded that this conduit could remain in place and be incorporated into the design of the GSA building.

It should be noted, however, that the Camp Dresser & McKee study did not anticipate the plan to close Nashua Street in the Phase II Sub-area. Therefore, even with the retention of the conduit within the GSA site, relocation still would be required in Sub-area II for the canal and island construction, since the proposed canal generally would follow the alignment of Nashua Street. Nevertheless, one advantage of the retention of the conduit in place in Sub-area I is that it would minimize relocation needs and costs should future development plans for Sub-area II retain Nashua Street or its alignment as an easement. The current plans for Sub-area I do not foreclose the option of abandoning Nashua Street entirely, as proposed, and of relocating the remainder of the CSO conduit.

No relocation of existing sewer and drainage lines would be required with the no-build option. Planned MDC improvements to the area's sewer system and combined sewer overflows, which are independent of the proposed redevelopment project, still would be implemented.

3. MDC Combined Sewer Overflow Project

As part of a comprehensive planning effort to control combined sewer overflows in Boston Harbor and its tributary waters, the MDC developed a recommended facilities plan for CSO abatement and control in the Charles River Basin study area, which includes the North Station renewal area. As noted previously, the principal elements of the recommended plan, as they affect the renewal project, are two-fold:

1. Connection of the Boston Marginal and Lowell (Nashua) Street overflow conduits to the Charles River Estuary Pollution Control Facility in Cambridge (this was actually a part of the Charles River Marginal Conduit Project and not a specific proposal of the CSO Plan) and has been completed, and

2. Installation of a bar screen at the Lowell Street overflow to remove floatables.

The environmental impacts of these projects are described fully in the Environmental Assessment Statement for Charles River Marginal Conduit Project in Cities of Boston and Cambridge, Massachusetts, Commonwealth of Massachusetts, Metropolitan District Commission, September 1974 (EOEA #01524) and the Submittal of Draft Report to Metropolitan District Commission on Combined Sewer Overflows - Charles River Basin Facilities Planning Area, Vol. I-III, Metcalf & Eddy, Inc., June 13, 1980 (EOEA #03830).

The proposed North Station renewal plan would impact each of these projects. Although the abandonment of Nashua Street and development of the adjacent property for the Federal Office Building will not require the relocation of the Nashua Street CSO conduit in Sub-area I (see Section 2 above), the construction of the proposed canal and island (in Phase II) would require the relocation of several major sewer facilities in the area, including the Lowell Street overflow outfall, the Nashua Street CSO and West Side Interceptor overflow conduits, and the extension of the Boston Marginal Conduit to the new Charles River conduit to Cambridge, since the proposed channel would be constructed along the alignment of these facilities. Also, the long-range DPW improvements at Leverett Circle, particularly the proposed tunnels under the existing rotary, would impact the major sewer conduits in the immediate area and potentially could require some relocations; while the tunnel alternative, in addition, would require the relocation of the 84" combined sewer in the Charles River since the Route 1 southbound tunnel would cross directly through this conduit. The tunnels to Leverett Circle, proposed under the artery depression plan, likewise would require relocation of these major conduits.

4. Private Utilities

There are existing gas, telephone, electric, and steam lines already in the streets in and around the North Station project, and a Boston Edison steam booster plant is located northwest of Minot Street. This plant is vital to maintenance of adequate steam pressure in the immediate area, and especially to the nearby Massachusetts General Hospital complex. Current redevelopment plans call for the acquisition and replacement of this facility. The necessity to maintain service to existing customers, as well as to provide adequate steam to Sub-area I should redevelopment here rely on a steam energy source, will be taken into account in the planning for the relocation of the plant during Phase II of the project.

Also, if the steam booster station is to remain functioning while Phase I of the project proceeds, then the steam lines in the Phase I area of Nashua Street may have to be relocated out of the proposed GSA development parcel, until the ultimate relocation of the station occurs in Phase II.

All private utility lines in the streets closed for development will need to be abandoned and/or relocated. The BRA will work closely with each private utility company to assure the ultimate adequacy of their networks to service the project area. Of particular importance, in the Martha Road/Leverett Circle area, will be the need to maintain continued operation of the Boston-Cambridge "A" Cable, at all times, since this conduit carries vital government and Civil Defense cables. (Under the tunnel alternative for the DPW Leverett Circle improvements, this cable would need to be relocated, as opposed to just being supported during construction with the bridge alternatives. All other private utilities would not be seriously affected under any of the alternative schemes. Similarly, the "A" Cable could be supported during construction of the Leverett Circle-depressed Central Artery tunnel, but other major telephone conduits would have to be relocated.) In general, the private utility systems now in place appear to be adequate to serve any needs of the proposed project.

5. Green Line Relocation Impacts

Of the two Green Line relocation alternatives, the elevated option would have significantly less impact on existing utility lines due to minimal below-ground construction related to the placement of columns and footings - principally the location of support piles. Major impacts under the subway option would occur at Causeway Street and Nashua Street. At Causeway Street, this impact would be minimized if the new subway profile were to approximate that of the Orange Line tunnel, which would permit most utility crossings to occur over the tunnel section, requiring only temporary support and perhaps some minor relocations during the construction phase. Greater impacts, however, would occur at Nashua Street, where the transition section from subway to elevated would be located. The profile of this transition would necessitate the relocation or alteration of all utilities in Nashua Street, including the major CSO conduit. Since the Green Line relocation would be implemented prior to Phase II development, the subway option would require temporary solutions and connections to the area's utility systems pending permanent relocation at a later stage of project construction.

The upgrading of the existing elevated structure option, as well as the no-build option, would have little or no impact on existing utilities due to the absence of any new construction activity which would affect utility easements.

6. Solid Waste

Full implementation of the proposed redevelopment of the North Station area would require the demolition of all buildings located in the project area. Total solid waste generated from this demolition is estimated to equal approximately 181,990 cu. yds. of debris (Appendix M-3), consisting principally of stone, masonry and brick material, concrete, structural steel, and wood. Under the reduced-scale option, demolition debris would be reduced by 25% to an estimated 137,145 cu. yds. Additional demolition waste, primarily structural steel with lesser amounts of wood and concrete, would be generated from the demolition of the Green Line elevated structure along Causeway Street and Lomasney Way, with the subway option requiring a slightly greater extent of demolition than the relocated elevated option. Furthermore, should the DPW decide in the future to remove the existing Storrow Drive Connector behind North Station, considerably more debris - mainly steel and concrete - would be produced.

Certain demolition material, particularly brick, stonework, steel and wooden structural members, and other masonry and metal components, has potential reuse value. Much of this material can be recycled for further use or be sold for scrap, thus reducing the amount of waste requiring disposal.

Site preparation, excavation, and actual construction activities also would generate debris. In Sub-area I (under either development option), it is grossly estimated that approximately 50,000-100,000 cu. yds. of earth would need to be excavated for below-ground construction (depending upon existing site conditions and the presence of existing basement levels). Additional building excavation would be required in Sub-area II, totalling approximately 65,000 cu. yds. for the preferred program or 35,000 cu. yds. for the reduced-scale program (assuming no excavation would be required on the man-made island). The construction of the canal in Sub-area II would necessitate the excavation of an estimated 156,300 cu. yds. of earth under the preferred plan, or 129,630 cu. yds. under the reduced-scale project.

Additional excavation material would be generated under the subway option for the Green Line replacement. Within the North Station project area, it is estimated that approximately 60,000 cu. yds. of earth would require removal for the subway tunnel and station platform area. Moreover, with the proposed DPW tunnel option for the Central Artery/Leverett Circle Connector replacement, it is grossly estimated that some 200,000 cu. yds. of excavation material could be generated within the project area and require disposal. Since a cut-and-cover method of construction probably would be used (existing tunnels and other restrictions would require a rectangular configuration for the tunnel sections, which would not lend themselves to a shield-tunneling method of construction), a considerably greater amount of material would need to be excavated, but much of this could be replaced following completion of the tunnels. Similar conditions would apply to the construction of the proposed tunnels to Leverett Circle/Storrow Drive from a depressed Central Artery.

Excavation material is a valuable commodity which can be sold to surcharge or fill land areas to prepare them for development. If development sites are unavailable, disposal would have to take place at an approved landfill site. Some of the dredged earth from the proposed canal possibly could be used as fill material for the proposed residential island. However, since much of the upper soil surface of the project area is fill material, its quality is poor and suitability for site preparation or fill is probably limited. Detailed analysis of the dredged materials will be required prior to any decision to reuse this material as fill for the island.

Building construction also will generate quantities of construction debris. Based on limited available data,* it is estimated that approximately 16,450 cu. yds. of construction debris would be produced by the preferred development program and 12,565 cu. yds. by the optional program.

The disposition of demolition- and construction-related solid wastes would be the responsibility of the private contractors. Those wastes which are not recycled or otherwise reused must be disposed of at disposition sites approved by the Commonwealth of Massachusetts. At the present time, there are five commercial landfills in the Northeast (Boston) region approved by the Commonwealth which could accept demolition and construction wastes.

The no-build option generally would not produce any of the above construction-related wastes, although some demolition wastes could be generated if additional buildings within the Billerica Street blocks are removed by the private sector, and substantial amounts of renovation wastes would be generated from the remodelling of the Boston Garden and Registry buildings.

Occupancy of the North Station development will result in the generation of garbage and other wastes by the proposed residential, office, commercial, and other uses. Based on several data sources,** it is estimated that full development of the project area would generate an estimated 23.32 tons of solid waste per day,*** or approximately 8,512 tons per year, for the preferred program. Under the reduced scale development program, a slightly higher estimate of 23.95 tons per day of trash would be generated, or approximately 8,742 tons per year (Table VI.D-3). (If a hotel were developed in place of the private office building in Sub-area I, estimated solid waste generation would be reduced to 21.64 tons per day (7,899 tons per year) with the preferred development program and 22.26 tons per day (8,125 tons per year) with the reduced-scale program.)

Phase I development is estimated to generate 13.06 tons per day under both program options (existing development in the Phase II area would continue to generate approximately 4.84 tons each day). (The hotel option would reduce Phase I generation by nearly 1.7 tons per day.) Under Phase II development, the preferred program is estimated to produce 10.26 tons of solid waste per day and the optional program, 10.89 tons.

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* Chatterjee, S., Urban, L.V., and Mickucki, W., ("Planning Suffers from Lack of Building and Demolition Debris Data," Solid Waste Management, February, 1975, p.12), apply a factor of 70 cubic yards of construction debris per 20,000 sq.ft. of building area.

** See Appendix M-1

*** Assuming full occupancy of the Boston Garden (Arena).

Table VI.D-3

ESTIMATES OF PROJECT-GENERATED SOLID WASTES

	Average Daily Generation			
	Preferred Program		Optional Program	
	(lbs.)	(tons)	(lbs.)	(tons)
Phase I Development Area				
Office development option	26,125	13.06	26,125	13.06
Hotel development option	22,755	11.38	22,755	11.38
Phase II Development Area	20,515	10.26	21,770	10.89
Total Project Area				
Phase I office dev. option	46,640	23.32	47,895	23.95
Phase I hotel dev. option	43,270	21.64	44,525	22.26
Annual Generation (Total Project Area)				
Phase I office dev. option		8,512		8,742
Phase I hotel dev. option		7,899		8,125

Source: Appendix M-2

The collection and disposition of residential solid waste is the responsibility of the City of Boston Public Works Department, which contracts with private firms for this service. Collection of non-residential solid waste is the responsibility of the individual property owner or manager who must contract privately for collection and disposal. All contractors must be licensed by the City and all disposal sites must be approved by the Massachusetts Department of Environmental Quality Engineering. At the present time, the City's residential trash is hauled to the RESCO recycling plant in Saugus, the Gardner Street landfill site having been closed in June, 1980. Currently, 14 municipal and 5 private sanitary landfills and incinerators approved by the Commonwealth are available within the Northeast Region for the disposal of commercially-collected wastes.

It should be noted also that the GSA has implemented an office waste paper recycling program for several Federal agency locations in Boston, including the John F. Kennedy Federal Building, which has contributed significantly to a reduction in demand for disposal from these buildings and would reduce the disposal demands of the proposed new GSA structure. In addition, the use of compactors can reduce the volume of trash by a two- or three-to-one ratio, significantly reducing the space needs for landfill sites.

Under no-build conditions, solid waste generation would remain essentially the same as currently exists, estimated to be approximately 9.32 tons per day (with a Garden event) or 8.20 tons per day without.

E. Physiographical Impacts

1. Topography and Land Features

Under the currently-proposed redevelopment plan for the North Station area, the principal physiological impacts of the project would occur in Phase II of the project with the construction of a canal in the general vicinity of Nashua Street on the west and approximately 250 feet north of the Storrow Drive Connector ramps and the creation of an artificial island partly within the confines of the Charles River. These actions would involve considerable dredging for the canal and land filling of the southern shoreline of the river for the island. Although the impact would be similar regardless of the development alternative ultimately pursued, the impact of the Preferred program, because it involves a larger canal and island, would be somewhat greater. Since the Phase II program is still conceptual at this stage of project development, these impacts, as well as the hydrological effects, will be examined in detail in a supplemental EIR/EIS for the Phase II development program.

For the remainder of the project area, no major alterations of the existing relatively level topography are proposed with either of the development options. Some miner changes in elevations, however, may occur due to grading and landscaping proposals. The pedestrian walkways along the river's edge, for the most part, are expected to be at the same elevation as the existing topography, but would be, of necessity, elevated approximately 20 feet to cross over the commuter rail tracks and surface roadways in order to provide an unobstructed pedestrian circulation system throughout the project area.

Under the no-build alternative, there would be no changes in land form, topography, or existing natural features in the project area.

2. Soils and Geological Conditions

Because of the existing soil structure in the North Station area (uncompressed fill material underlain by organic and marine deposits and glacial till) and the depth to bedrock (in some places as much as 40-60 feet below grade), the load-bearing capacity of the soil is fairly low. Consequently, it is expected that end-bearing piles supported on the glacial till or the bedrock will be required to support the structures proposed for the project area. Some piles, however, may need to be driven deeper into the bedrock due to its soft weathered surface. A caisson foundation, transferring structural loads to the till and bedrock, also is a possibility, although fissures in the rock or pervious zones within the till may produce large quantities of groundwater, making the installation of caissons difficult because of dewatering considerations. For low-rise buildings, excavation of the fill (and organic soil deposits) and replacement with compacted granular material may provide a suitable base to support mat foundations or spread footings. Since foundation design depends on a variety of factors, including the number of stories for a proposed building, the structural system, building loads, and the actual subsurface conditions underlying the structure, more detailed subsurface investigations will be required during the design phases of the project. These investigations are essential to avoid unforeseen subsurface problems as well as to assist in locating any underground, man-made, obstructions which may exist, such as abandoned and demolished foundations or utility lines.

The effects of driving piles through Boston Blue Clay have been observed over the past few years, and it is now known that this disturbance can cause settlement some distance away from the pile location, depending on the number and type of piles driven. Any future pile driving on the site, therefore, should evaluate and attempt to minimize the amount of potential disturbance and resultant area subsidence.

Pile driving also will result in the production of ground vibration, which, if prolonged or severe, can damage nearby buildings. If exposed to extremely high levels of vibration, a building may suffer major damage, such as serious structural damage, glass breakage, and serious plaster cracking or falling plaster. For lower levels of vibration, minor damage - fine plaster cracking and reopening of old cracks - may be observed. Investigations by the U.S. Bureau of Mines have indicated that ground vibration with peak particle velocities on the order of 7.6 in/sec. may cause major damage in residential structures, whereas velocities near 5.4 in/sec. may cause minor damage. A safe blasting limit is suggested at 2 in/sec. peak. Other studies have determined that the threshold of architectural damage to buildings (e.g., fine plaster cracks) occurs at peak particle vibration of 0.2 in/sec., which level, while considerably below the safe blasting limit, does make allowances for buildings of all types and for the triggering effects of vibrations. (1)

Vibration propagation would depend on many factors, including the type of soil, the impact rate of the pile driver, the height of the drop, etc. Based on available data for the North Station area architectural damage may be possible at distances of up to 200 feet and building damage up to 20 feet. Therefore, a preconstruction survey to document existing building conditions should be carried out for all buildings within 200 feet of the proposed pile driving locations. This is usually performed by the construction firms, who also would be responsible for repairing any damage caused by the pile driving operations.

In addition, some consideration may be given to reusing existing pile foundations for new structures in the project area, such as reusing the wooden piles supporting the Madison Hotel for the proposed Federal Office Building. While this would reduce the impact of new construction, issues that must be addressed before using such piles include their condition, design load and capacity, length and bearing material, and elastic compressibility.

Excavation at least 12 feet below grade (one level) is anticipated for the Federal Office Building, the new Arena, and the parking garage in Sub-area I, and is reasonable to assume for the remaining buildings as well. Because of the extensive area of excavation necessary, a lateral support system will be required to prevent erosion and land sliding into the excavated area, which could cause considerable damage to nearby buildings, and to maintain vertical slopes and reduce encroachment of off-site areas. Methods of constructing lateral support include interlocking steel sheet piling, soldier piles and lagging, and slurry walls. Interlocking sheeting would be the preferred method since it can be used as both lateral support and, when tied into the underlying silt, as a groundwater cutoff. (A slurry wall would not be cost-effective for the proposed relatively shallow excavation.) The sheet piling also can be used to maintain lateral support adjacent to off-site pile foundations, such as the MBTA Green Line elevated structure and the North Station/Boston Garden building. Internal bracing may be required adjacent to areas of pile supported structures, as well as underpinning of adjacent buildings.

Compliance with the State Building Code will assure that future structures will be capable of withstanding forces exerted by earthquakes in a high-risk area. Earthquake design provisions are contained in Section 718 of the Code, which requires that buildings be capable of safely withstanding stresses produced by lateral forces from any horizontal direction.

Similar geotechnical impacts would be encountered with the construction of the relocated Green Line, Storrow Drive Connector replacement, and/or the Leverett Circle-depressed Central Artery tunnels. Proposed elevated alignments would require deep foundation (piles or caissons) support bearing in the marine deposits or the glacial till, depending on the magnitude of the loads involved and on the particular properties of the soils at each support location. Most difficult would be the support for a Green Line section between the Analex Building and North Station/Boston Garden, where deep foundations would have to straddle, within a limited width, both the existing Orange Line tunnel below Accolon Way and the pile caps of the Analex Building, which extend approximately 2½ feet out from the building wall. For tunnel alternatives (Green Line and highway), piles or caissons, or deep foundations, likewise would be necessary to support a new tunnel structure, due to the generally poor bearing capacity of the soils in the area. In some areas, however, tunnel foundations may be able to rest on more suitable material, such as glacial till or the blue and yellow clay deposits, and therefore not require extensive support. Sheeting and shoring would be necessary along the excavation route, as would be underpinning of the existing elevated transit and highway structures where the proposed tunnel would cross beneath. In addition, jacking of new piles and cross members to permit removal of some internal piles supporting the Boston Garden building in the subway tunnel alignment would be necessary.

The no-build alternative would have no effect on soils and geologic conditions in the project area as it would involve maintenance of the _status quo_.

3. Groundwater Impacts

As noted in the previous Part, continuous operation of the new Charles River Dam is expected to stabilize the groundwater elevations at approximately elevation +8 (BCB), or about 6-9 feet below grade (previously, when this section of the river was tidal, groundwater levels fluctuated generally between elevations +8 and +3). Proposed excavations of about 12 feet below grade, therefore, will penetrate into the water table and will place basement levels approximately 4 feet below the groundwater level. As a result, all site excavations are expected to require dewatering in order to ensure the maintenance of existing groundwater levels as close as possible to the construction sites. Any lowering of the groundwater in the surrounding area would cause a compression of the soft organic silts and potentially damage nearby structures, as well as expose existing wooden piles to rotting.

Special attention will be required to construction methods which will not adversely affect groundwater levels beneath adjacent properties. The use of interlocking steel sheet piling at construction sites can assist in groundwater control to reduce the off-site impacts of dewatering by forming a groundwater cut-off. Recharging of the water table immediately outside the excavation also can prevent extensive lowering of the water table. Within the excavation site, pumping by sumps as an additional control may be required to reduce seepage. Groundwater pumped during dewatering operations would be channeled into sewer lines in the area. However, if the groundwater had much sediment, it could deposit this sediment in the sewer lines and result in their partial clogging, potentially causing sewage backups and spillage. Suitable precautions, such as the use of equipment designed to trap or reduce the discharge of solids into the drainage system, can be employed to mitigate the adversity.

Under the provisions of Section 1300 (Excavation) of the _Massachusetts State Building Code_, the construction contractor is held responsible for the surveillance of adjacent properties and for the protection of those properties against damage from dewatering (and other construction-related work). Therefore, contract documents should specify that excavation be carried out in a manner which avoids adverse changes in groundwater levels and that an observation program of monitoring off-site groundwater levels be established. If an adverse affect is noted, groundwater recharge may be necessary. Finally, in order to ensure minimal impact on adjacent properties, a thorough investigation and analysis of soil and groundwater conditions at and around the site will be required from the contractors, the design will have to adhere faithfully to the results of such studies, and strict control will have to be exercised over construction procedures.

Since foundations are expected to intrude the water table, construction capable of resisting water pressures and to compensate for the uplift pressures of the groundwater will be necessary. Therefore, basement slabs would require either an underfloor drainage system or a structured mat to resist hydrostatic uplift. Waterproofing of basement levels also would be necessary.

For the Green Line and the alternative Leverett Circle/Central Artery connector actions, similar groundwater impacts during construction could be expected, particularly with the subway/tunnel options. Techniques to control groundwater drawdown during construction and to protect the remaining piles supporting adjacent buildings would be required to be developed during the design phases of these projects. As with the building construction, interlocking sheeting penetrating the organic silt can effectively act as a groundwater cut-off. Since the proposed subway and highway tunnels would be located below the water table (and below the river for the Leverett Circle-City Square tunnel option), waterproofing also would be required.

The no-build option, since it does not involve any changes in the project area, would have no impact on the groundwater.

F. Water Quality and Hydrology

1. Water Quality

Water quality in the Lower Charles River Basin parallel to the North Station project area is expected to improve progressively over the next several years primarily as a result of the new Charles River Basin Pollution Control Facility (Prison Point Pump Station) and the new Charles River Dam. The Pollution Control Facility became operational in January, 1981. This facility, located in Cambridge between the old and the new Charles River Dams, has a storm-phase storage capacity of 385 million gallons per day (600 cu. ft./sec.). Dry weather flows from six major combined sewer overflows* to the Charles River Basin and its tributaries are diverted to this facility and pass through coarse and fine screens. The dry weather flows are then pumped out into the MDC Charlestown Branch Sewer, where they are transported to the Chelsea Creek Headworks. (Previously, these dry weather flows received no treatment and were discharged into the Charles River Estuary and Boston Inner Harbor below the old dam.)(1)(2)

During wet weather, flows will be diverted to the Pollution Control Facility and screened, settled and chlorinated before being discharged into the Inner Harbor below the new Charles River Dam. Retained flows will be pumped to the Charlestown Branch Sewer at the end of a storm for treatment at Deer Island. Operation of this pumping station thus will abate the pollution from combined sewerage overflows to the Basin as well as storm flooding in the tributary area.

With the completion of the Prison Point facility, flows from both the Lowell Street Overflow and the Boston Marginal Conduit, which formerly discharged into the Basin just below the old dam, have been diverted via a new 84" conduit underneath the Charles River to the pump station. The outfalls, however, are still maintained to handle storm events which exceed the capacity of the station, which was designed for a 1-year, 6-hour storm event. In addition, the new Dam, by eliminating the tidal influence in the Boston Marginal Conduit, has eliminated a potential secondary source of salt water intrusion to the Basin. (3)

The Charles River Estuary Pollution Control Facility will eliminate approximately 85% of the CSO pollutants originating in the Charles River Estuary sub-area of the Basin, and this should have a positive impact on water quality in the lower Charles River Basin. It is anticipated that the frequency and quantity of overflows from the sub-area would be quite small - about once a year when rainfall intensity exceeds 0.75 inches per hour.(3) It is expected that the Facility will have removal rates for BOD_5 and suspended solids of 30% and destruction of coliform bacteria of 99%.(1) This should result in an achievement of water quality standards and objectives in the Charles River Basin and ensure that the Basin will meet its Class C classification.(3)

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* Boston Marginal Conduit, Lowell Street Overflow, Binney Street Combined Storm Drain Overflow, Msgr. O'Brien Highway Combined Storm Drain, Cambridge Marginal Conduit, and Millers River Overflow.

In addition to the Pollution Control Facility, the MDC has prepared a Combined Sewer Overflow (CSO) facilities plan for the Charles River Basin. Within the North Station project area, the recommended plan calls for the installation of a bar screen and access chamber to the Lowell Street overflow conduit in order to prevent floatables in the CSO from entering the Charles River during storms greater than the one-year design storm. This project, currently scheduled for 1993-94, will have a minor additional beneficial impact on water quality since it will reduce the amount of floatables and debris entering the river but it will have no other effect on water quality or biota.(3)

The new Charles River Dam, although completed as of May, 1978, did not become fully operational until the Pollution Control Facility was completed. Now in operation, improved lock operations are expected to nearly eliminate the former salt water intrusion at the Dam and thereby significantly reduce the extent of the stagnant bottom layer.(3) This reduction is accomplished by replacing the single large (350 ft. x 45 ft.) lock in the old dam with two small (200 ft. x 22 ft.) locks and one large (300 ft. x 40 ft.) lock in the new dam, thus separately accommodating large commercial ships and the small pleasure boats.

During the construction period, water quality could be temporarily impacted from soil erosion, resulting in increased turbidity and sedimentation in the river, and from an increase in suspended solids in the surface runoff from site clearance and excavation activities, building demolitions, and wetting down the site to reduce dust emissions. If chemical stabilizers are used for dust control, the potential for additional water pollution would result. In addition, the pumping of water which has collected on the site from storm events or groundwater infiltration into the City's storm sewer system also would adversely impact water quality unless appropriate precautions are taken, such as the installation of sedimentation traps to settle out the sediment and hence reduce the discharge of solids into the drainage system. However, since the ratio of volume of discharge from the site to the volume of the receiving waters (Boston Harbor) would be extremely small, the impact of the suspended solid load on the quality of the Harbor waters would be insignificant. Moreover, with the recent MDC pollution control improvements in the area, discharges into the sewer system would be screened and settled at the Prison Point Pump Station prior to discharge into the Harbor and normally would not overflow into the Charles River.

During Phase I of the project, there should be no direct impact on the Charles River from runoff or soil erosion, since no construction is expected to occur adjacent to or near the river. For Phase II construction activity, appropriate sedimentation controls, such as the use of bales of hay, or channels to direct runoff, crushed stone filtration wells, sedimentation basins, or siltration curtains, can be employed to prevent suspended solids from entering the river. Operational measures also are available and include the phasing of construction activities to minimize the amount of exposed soils, the covering of disturbed areas and storage piles, and rapid revegetation. Any construction within 100 feet of the shoreline would be required to obtain a Wetlands permit from the Boston Conservation Commission and would be subject to compliance with any Order of Conditions issued under this permit.

Contamination of surface runoff also can result from accidental spills of oils, grease, and fuel during construction equipment maintenance operations. These impacts may be minimized by establishing a central staging area for all construction equipment and by developing fuel spill control measures for the area. All used oils from trucks and heavy machinery should be collected in closed containers and be properly disposed of off-site.

Further increase of pollutants in the urban runoff could occur along the haul routes of the material excavated from the site, due to the potential for spillage from the dump trucks. Based on EPA data,* it is estimated that the maximum amount of potential spillage could be 0.11% of the total excavation material (although this figure is probably overly conservative).(4) For Phase I (100,000 cu.yds. of excavation @ 110 lbs. cu.ft.), spillage could amount to approximately 160 tons, with an additional 255 tons from the canal excavation in Phase II (210 tons under the optional program). Such spillage can be minimized or eliminated by not filling trucks above their tops or by securely covering the loads before leaving the site.

In terms of long-term impacts from Phase I, the proposed sewer and drain work should enhance water quality by replacing several older mains and connections. All storm water from the development site would be channelized into the new storm drainage system, and the impacts of grease and oils from parking facilities can be mitigated by use of oil traps or oil absorption techniques at the source of the runoff. No sewage discharges would be permitted from the proposed development into the Charles River.

The effects on water quality from the more complicated Phase II of the North Station project will be studied in detail in a supplementary environmental impact report/statement for this phase, when more specific design and development plans have been prepared. Both the construction and operational stages of dredging a canal and filling for development of an island in the Charles River Basin will be analyzed. It is expected that any impacts on water quality from the later developments will be more to the secondary effects of hydrologic changes as opposed to direct pollution of the stream, although significant impacts, including increased levels of turbidity and concentrations of suspended solids, contamination from the dredging of the polluted bottom sediments, and biological damage, would occur during the construction period. Table VI.F-1 presents a summary of

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* Compilation of Air Pollution Emission Factors, (AP-42), 1972.

Table VI.F-1: Summary of Test Results of Materials to be Dredged
(Values Shown are Percent of Sample's Dry Weight)

Pollution Parameter	Number of Samples	Date	Maximum	Minimum	Average
Volatile Solids	5	May 1972	15.12	3.02	9.84
	10	Jul 1972	25.20	2.62	11.87
Chemical Oxygen Demand	5	May 1972	31.18	4.54	18.26
	10	Jul 1972	59.72	2.52	25.62
Total Kjeldahl Nitrogen	5	May 1972	0.49	0.04	0.28
	10	Jul 1972	0.87	0.05	0.33
Oil and Grease	5	May 1972	3.33	0.20	1.72
	10	Jul 1972	8.56	0.06	2.16
Mercury (x10^{-5})	5	May 1972	30.9	4.0	17.2
	10	Jul 1972	35.0	5.0	24.0
Lead (x10^{-3})	5	May 1972	127.52	33.52	86.66
	10	Jul 1972	129.79	5.84	54.48
Zinc (x10^{-3})	5	May 1972	134.44	12.09	67.96
	10	Jul 1972	234.04	9.54	86.29
Copper (x10^{-3})	5	May 1972	69.88	6.05	34.12
	10	Jul 1972	75.43	7.43	34.07

Source: Department of the Army, New England Division, Corps of Engineers, Charles River Dam, Boston, Massachusetts, Final Environmental Statement, Waltham, Mass., July 1973.

test results of the composition of dredged material for the construction of the new Charles River Dam. The dredge material for the proposed canal would be expected to be quite similar.

Another serious problem would involve the disposal of the dredged materials at an environmentally acceptable site. According to the Massachusetts Clean Waters Act regulations (314 CMR 9.03) this dredged spoil would be classified as Category Three and Type C, or as exhibiting the most severe degree of contamination (see Table VI.F-2). Normally approvable dredging, handling, and disposal options are indicated in Table VI.F-3. For ocean disposal, it should be noted that Corp of Engineers regulations would require a bioassay, performed according to EPA procedures, to determine biological impact prior to issuance of a permit. Either development option would have basically the same impacts, although the magnitude of the Preferred program would be somewhat greater since a larger canal and island would be created under this option.

As noted in Part V.C.3, urban stormwater runoff transmits high concentrations of heavy metals, asbestos, and petroleum products which are directly related to disposition and emissions from motor vehicles, de-icing salts applied to the area's roadways and parking areas, and chemicals used in pesticides and fertilizes for the maintenance of vegetation. Although much of this runoff is directed into the storm drainage system, that from land uses adjacent to the Charles generally flows directly into the river. At the present time, nearly all of the land area near the river has impervious surfaces, being paved parking lots, roadways, or sites developed with buildings; very little grass-covered land, which can absorb most of the rainfall, exists. (The rail yards and track area also are relatively pervious.) Based on the "rational" method for measuring runoff, and using Boston data, (5) it is estimated quantitatively that current runoff for a ten-year storm from Sub-area II (which is that portion of the project area generally adjacent to the river) is 34.2 cu. ft./sec.

Under the Preferred development program, total land area in Sub-area II is reduced by 4 acres and landscaped/ground areas are increased significantly from the current 2% to 20% of the sub-area, resulting in a reduction of total runoff to 27.7 cu.ft./sec. Under the less intense optional development program, total land area for this sub-area is reduced by only 3 acres but landscaped/grassed areas are increased to one-third of the total sub-area development. The resultant runoff intensity would then be further reduced to 24.7 cu.ft./sec. Although some rainfall would continue to drain into the river regardless of the alternative developed, the elimination of surface parking lots adjacent to the river, the construction of improved storm drainage facilities as part of the proposed development, the addition of the parkland buffer along the riverfront, which would act as a natural filter, and completion of the recent MDC pollution control projects should result in a reduction of runoff contamination from the project area. The use of porous pavements for street surfaces also could significantly reduce runoff (as well as discharges into the storm sewer system) and, concurrently, pollutant loadings.

TABLE VI.F-2: CLASSIFICATION OF DREDGE OR FILL MATERIAL

PART A.

Classification of Dredge or Fill Material
By Chemical Constituents
All units are in parts per million

	Category One	Category Two	Category Three
Arsenic (As)	< 10	10-20	> 20
Cadmium (Cd)	< 5	5-10	> 10
Chromium (Cr)	< 100	100-300	> 300
Copper (Cu)	< 200	200-400	> 400
Lead (Pb)	< 100	100-200	> 200
Mercury (Hg)	< 0.5	0.5-1.5	> 1.5
Nickel (Ni)	< 50	50-100	> 100
Polychlorinated Biphenyls (PCB)	< 0.5	0.5-1.0	> 1.0
Vanadium (v)	< 75	75-125	> 125
Zinc (Zn)	< 200	200-400	> 400

PART B.

Classification of Dredge or Fill Material
By Physical Characteristics

	Type A	Type B	Type C
Percent silt-clay	< 60	60-90	> 90
Percent water	< 40	40-60	> 60
Percent volatile solids (NED methods)	< 5	5-10	≥ 10
Percent oil and greases (hexane extract)	<0.5	0.5-1.0	> 1.0

Source: 314 CMR 9.03

TABLE VI.F-3: NORMALLY APPROVABLE DREDGING, HANDLING AND DISPOSAL OPTIONS

CHEMICAL TYPE (TABLE I)	Category One			Category Two			Category Three		
PHYSICAL TYPE (TABLE II)	A	B	C	A	B	C	A	B	C
Dredging Methods									
Hydraulic	X	X	X	X	X	X	X	X	X
Mechanical	X	X	X	X	X	X	X	X	X
Disposal Methods									
Hydraulic: Sidecast	X	X	0	0	0	0	0	0	0
Hydraulic: Pipeline	X	X	X	X	X	X	X	X	X
Mechanical: Sidecast	X	X	0	0	0	0	0	0	0
Mechanical: Barge	X	X	X	X	X	X	X	X	X
Placement									
Land or in-harbor disposal with bulkheading:	X	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Open ocean disposal at high energy, sandy sites	X	0	0	0	0	0	0	0	0
Open ocean disposal at low energy, silty sites	0	X	(b)	0	(b)	(b)	(b)	(b)	(b)
Unconfined in-harbor	X	0	0	0	0	0	0	0	0
Beach Replenishment	X	0	0	0	0	0	0	0	0
Other Conditions									
Timing and Placement to Avoid Fisheries Impacts (spawning and running periods and areas)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)	(c)

Legend:
X = Normally approvable
0 = Not normally approvable
(a) = Normally approvable but control of effluent will be required
(b) = Approvable only after bioassay, performed in accordance with established EPA procedures, indicates no significant biological impact. A statistically comparable project which has successfully passed the bioassay test may be substituted. If a significant biological impact is found, this material is unsuitable for open water disposal.
(c) = Required in all cases.

SOURCE: 314 CMR 9.03

None of the Green Line improvement alternatives is expected to have any impact on water quality. Significant impacts, however, would result from implementation of any of the Central Artery/Leverett Circle Connector improvements, particularly during the construction phase. Since both bridge and tunnel options involve construction within the Charles River itself, high levels of turbidity and release of the polluted bottom sediments into the water column would occur. The impact would be more damaging with the tunnel option since a much greater area of river floor would be excavated, resulting in higher levels of turbidity from the suspended sediment. A cut-and-cover method of construction most likely would be used, due to the required rectangular configuration of the tunnel section, which would necessitate cofferdams blocking up half the river basin at a time. Moreover, the tunnel alternative would require the filling of part of the river basin along its southern bank, slightly restricting the waterway between the two dams. In the long-term, the impact of the bridge options would involve the addition of highway runoff, typically contaminated with oil, grease, heavy metals, and other pollutants, discharging into the river, which would be avoided with the tunnel scheme.

Construction of Leverett Circle to Central Artery connecting tunnels under the alternative Artery depression project would have very similar water quality impacts as the earlier-proposed Connector improvements, since the tunnels would be partially constructed within the channel of the Charles River. However, there would be a much lesser amount of construction within the waters than with the Leverett Circle-City Square tunnel, resulting in lower levels of turbidity and release of polluted sediments. In addition, approximately 0.7 acres along the banks of the Charles between the MBTA bascule bridge and the new Dam would be filled to support roadway construction.

The no-build alternative would have minimal impacts on the Charles River water quality, since the MDC pollution abatement projects are independent of the North Station development proposals. The principal impact would be continuation of the existing degradation from contaminated urban runoff particularly from the parking areas adjacent to the shoreline. Although traffic volumes in the area would increase, even without the project, these increased volumes would not be expected to generate enough contaminated runoff to cause a measurable increase in pollutant levels in the Charles River.

2. Hydrology

It is not anticipated that Phase I of the project, regardless of alternative, will have any effect on hydrological conditions in the Charles River Basin since site work and construction will occur within the land area boundaries.

Phase II of the project, which involves dredging of a canal and development of an island in the Basin, could have significant impacts on flow and existing structural facilities in the stream.

Extensive hydrological studies will be conducted for this development to insure that any construction will be engineered to avoid short-term and long-term adverse effects on the hydrological system. In general, the following factors will have to be taken into consideration in determining the hydrological effects: the depth and flow area of the Basin between the old and new dams, stream velocity, potential for scouring and undermining the old B & M Railroad pilings, effects on the walls on the Cambridge side of the Basin, and the hydrological effects on the pumping station at the new Dam. A major consideration also will be the adequacy of a narrowed channel for navigation by large commercial boats in terms of having sufficient width for two-way passage and safe turning radii. The results of these studies will be incorporated into the supplementary EIR/EIS for the Phase II development plan.

3. Flood Control

The proposed North Station project elements should not have any adverse or exacerbating effects on flooding or flood control in the project area. As indicated previously, the new Charles River Dam has been designed to improve the hydraulics of the Charles River Basin and to control flooding to a level 50% greater than the 100-year storm level. The new dam provides an additional 25 acres of surface area to the Basin and has a maximum pumping capacity of 8,400 cfs. This pumping capacity will effectively maintain the basin elevation at a near-normal level of 3.3 feet MSL (9.0 feet BCB) during a 100-year flood event and thus prevent any serious flooding problems along the Basin.

Detailed hydrological studies will be conducted in relation to construction of the island and dredging of the canal to ensure that any configurational changes in the Basin do not adversely alter the existing hydrology or affect the pumping operation or capacity of the new dam. In terms of the effects of flooding on the proposed housing to be built on the island, detailed analyses for Phase II also will be undertaken to ensure proper structural conditions and elevation to protect against flooding.

The no-build option would not affect the existing flood control efforts in the project area nor the hydrological characteristics of the Basin between the two dams.

G. Vegetation and Biological Resources

1. Vegetation

Existing vegetation within the project area is very sparse. To implement Phase I development, the few trees planted along Nashua Street will have to be removed. These trees are relatively young Little Leaf Lindens with approximately four-inch trunk diameters. Due to costs and the fact that a transplanted tree cannot be guaranteed by a contractor, it is impracticable to save the trees. However, included in street construction in the project is the provision of tree plantings along the new streets, as well as along the reconstructed Causeway Street. The net result of Phase I activities will be an increase and enhancement of vegetation in the project area.

Phase II of the project, which involves building demolition, the canal and island development, and new construction, will have a greater impact on the existing vegetation. The adverse impacts on vegetation will be primarily those generated by disturbance of the landscaping surrounding the Massachusetts Rehabilitation Hospital and the Registry Building when these buildings are demolished, and disturbance of the wild vegetation along the river bank for waterfront development. Although this vegetation will be disrupted, the adversity will not be significant since it consists of common wild plant species and landscaping, as indicated in Table V-10. The project will create significant open space and planted areas that will greatly outweigh the initial short-term impacts. Plantings would include various shrubs, bushes, tree species, and grassed areas, and probably flowers and ornamental plants as well. The edge of the river will be landscaped, and street trees and extensive plantings will be included in development on the island. To improve the opportunity for survival, the type of trees selected should be native, rather than introduced, species and should be species suitable to an urban environment. Shadows created by the proposed buildings must be considered when landscaping and vegetation material area incorporated into the final site designs.

Similar landscaping proposals are included in the optional development program, where a much larger area would be devoted to planted open space. Under the no-build option, the existing planted landscaping and the natural wild growth along the riverfront would continue to exist as is.

2. Wildlife

Wildlife in the project area consists of small rodents, pigeons, sparrows, seagulls and starlings which are common to urban environments. The river also is frequented by a variety of waterfowl. Project activities in Phase I and II will disturb the ground animals, causing them to move their habitat, but will have no significant adverse effect on rodent or ornithological life. In particular, demolition and land preparation activities and street reconstructions will displace rat populations inhabitating old sewer lines and basement areas into adjoining properties, requiring rat control efforts prior to these activities to eliminate health risks. After completion, the project (either alternative) will offer a larger and more hospitable habitat for wildlife by increasing the vegetation in the project area. There would be no disruption of wildlife or of wildlife habitat with the no-build alternative.

3. Aquatic Biology

With continued operation of the Charles River Estuary Pollution Control Facility, the algal types found in the future should be similar to those presently found. Marine species, however, should become less common because of the reduced salt water intrusion. Because there is an abundance of nutrients, there is the potential for algal densities to increase significantly in the future if reduced suspended solids and increased residence time increase the photic zone. The partial destratification of the Basin may permit the recolonization of previously anaerobic sediments by benthic invertebrates in localized areas. However, some bottom waters in the Basin may remain anaerobic at least during the summer months and may continue to contain toxic concentrations of hydrogen sulfide and ammonia. In addition, the DO content of some surface waters in the lower portion of the Basin is expected to be unsuitable for most forms of aquatic life just after storm events, during dry or low flow years when the assimilative capacity of the Charles River Basin is lowest.(1)

The future finfish community of the Charles River Basin should not be different from the existing with regard to species present. However, the present dominance by brackish water forage fish may shift to dominance by fresh water forage fish such as shiners and minnows. The restoration of the anadromous fishery through installation of fishways at the new Charles River Dam should permit passage of alewife, blueback herring and American shad through the Charles River Basin.(1)

In-system modifications (installation of a bar screen at the Lowell Street overflow), however, will have little effect on biota because pollutant levels in the river during overflow events would not change appreciably.

Phase I of the project will have no significant adverse impact on aquatic life. Water contamination and turbidity can be controlled and mitigated during construction and thus there will be no significant source of impact on existing aquatic biology.

Phase II of the project will involve dredging and filling the river and will have significant potential for impact on aquatic life and organisms. These impacts and appropriate controls and mitigation measures will be evaluated in detail as part of the environmental studies conducted for this later phase of the project. Particular attention will be given to the protection of the restored anadromous fishery in the Charles River, including restrictions on construction activities during periods of passage and spawning. In addition, both the bridge and the tunnel alternatives for a future Central Artery/Leverett Circle Connector improvements, as well as the Central Artery depression proposal, would impact the aquatic life of the Basin, particularly the benthic (bottom dwelling) communities. Construction within the river itself would severely disrupt these communities, with the tunnel option of the Connector improvements project, which would involve the excavation of a much greater area of the river floor, resulting in a higher destruction of the benthic community. However, this impact would only be temporary, since the recovery period of these species has been well documented as typically less than 3 years.

Any alteration of the shoreline, or modification of the river channel by dredging and construction of the island and by other activities, would require compliance with the provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661-666c).

The no-build option would have little effect on the aquatic biology of the adjacent Basin, since the MDC improvements are independent of the North Station development program. Some water contamination would continue from uncontrolled urban runoff in the area, which could adversely affect fish and aquatic organisms.

H. Air Quality Impacts

1. Future Air Quality Predictions

1.1 Introduction

The construction of a major redevelopment project in the downtown area has the potential to affect ambient air quality in several ways, including:

- demolition- and construction-related emissions of fugitive dust, and exhaust gases from heavy construction equipment;
- emissions from additional roadway vehicle trips to the area;
- redistribution of traffic (and, hence vehicular emissions) caused by employees moving from existing buildings within the city to the proposed project area;
- direct emissions from parking facilities associated with the proposed project; and
- pollutant emissions released as a result of the burning of fuel (gas or oil) on-site, or increased loading on electric generating plants that the serve the city.

For the North Station urban renewal project, an air quality impact assessment, prepared by Bolt Beranek and Newman, Inc., of Cambridge, Massachusetts, (1) has concentrated on the transportation elements of the Plan (motor vehicle and railway emissions).* This analysis is made up of three components. The first component inventories the emissions of carbon monoxide (CO), oxides of nitrogen (NO_x), and nonmethane hydrocarbons (NMHC) from all transportation sources in the study area** and compares the various project alternatives with the no-build and the existing conditions. The second component consists of estimating 1-hour and 8-hour CO concentrations at key receptor locations under various project alternatives and comparing these estimates with applicable standards. The third component addresses the impact from diesel locomotives and examines the ventilation requirements associated with the proposed covering of the North Station tracks for potential air-rights development. The modeling analysis addresses the existing conditions and the no-build, the preferred, and the optional alternatives in the years 1987 and 2000.

Details of the modelling program and assessment methodology are presented in Appendix N.

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* An analysis of air pollutant emissions resulting from potential energy scenarios for the project area is included in Section J, Energy.

** The air quality study area has the same boundaries as the traffic impact area.

1.2 Project Area Meteorology

The meteorological parameters that affect the transport and dispersion of airborne pollutants include wind direction, wind speed, and the stability of the atmosphere. The prevailing wind direction dictates the general direction of movement of the airborne pollutants. Low wind speeds and calm conditions are conducive to buildup of pollutant concentrations. The stability of the atmosphere affects the dilution or the mixing rate of the air containing the pollutant. Calm conditions cause poor dispersion and resulting higher concentrations, whereas an unstable atmosphere promotes both vertical and horizontal mixing.

Wind speed and wind direction at rooftop level were measured at the permanent monitoring site on Causeway Street (Figure V-22). The continuous data recorded during a three-month period (July-October, 1980) indicated that during this period wind from the west was most frequent, accounting for about 23% of the time. Winds from the south-southwest through the west directions together accounted for over 68% of the total observations. These southwesterly winds will result in the transport of pollutants from Cambridge Street and the Government Center area to the project area. These directions also will put the project area generally upwind of the Central Artery and associated ramps. Calm conditions and winds less than 1 mile per hour - conditions conducive to poor ventilation and higher pollution levels - together account for about 0.2% of the time.

2. Air Quality Impact Assessment

2.1 Construction-Related Air Quality Impacts

Construction-related activities can result in a temporary impact on ambient air quality. These short-term adverse impacts would be spread over the 15-20 years required to complete the total redevelopment project. Sources of emissions would include building demolitions, land clearance and excavation, construction activities, and construction equipment and trucks and related traffic.

The most significant impact would be substantial increases in the amount of particulate matter, or fugitive dust, released into the atmosphere as a result of demolition, loading of the rubble into trucks, and grading of the vacant site, and from the movement and hauling of dirt during land clearance, site preparation, and excavation operations. Based on a previous study of demolition in the Boston area,(2) it is estimated that the proposed demolition of 554,126 cu.yd. of buildings within the North Station project area would produce a total of 176.8 tons of particulate matter.* Demolition within Sub-area I would generate an estimated 129.1 tons of dust. With the reduced-scale development program, total particulate emissions from building demolitions would be reduced by nearly 25%, to 133.2 tons, 97% of which would be generated from Phase I activities occuring within the first 5-7 years of project execution.

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* Based on 6.7 lbs. of dust per ton of demolition waste. Total demolition weight of the buildings to be demolished is estimated at 52,777 tons.

One method of building demolition, besides the more conventional use of a crane clamshell bucket or steel ball, which has been used in Boston and elsewhere to demolish larger structues, is the "implosion" method, or the use of explosives to bring the building down upon itself. While this method, at the time of the actual explosion, does generate an excessive amount of dust and other particulate matter (in the form of a massive cloud) the dust generated by the demolition is generated only once; and there is no continual dust emission over a several week or month period at upper levels where it cannot be controlled. Under favorable conditions (no wind, wet weather), the dust cloud would settle quickly in the immediate vicinity of the project. Considerable soiling of exterior surfaces of adjacent buildings would occur. On the other hand, air inlets at nearby properties could be turned off temporarily rather than potentially being adversely affected over a longer period from conventional mechanical demolition. This method of demolition has been under consideration for the larger buildings within the project area (and, in fact, was the method used for the demolition of the Madison Hotel on the GSA site).

It is also estimated that land clearance and excavation activities in Sub-area I would involve the movement of approximately 135,465 cu.yds. of earth, which would add an estimated 270.9 tons of dust to the atmosphere (based on an EPA emission factor of 4 lbs./cu.yd.). Additional fugitive dust emissions would be generated from site preparation activities in the Phase II area, including excavation for buildings, dredging for the canal, and creation of the island, but the amount cannot be estimated accurately at this stage of project development. (The Green Line relocation, more especially the subway option, and the DPW Leverett Circle improvements, if implemented, would also add fugitive emissions to the atmosphere.) However, with the high water table in this area, the silt content of the soils, and the region's moderately humid climate (approximately 140 days with 0.01 inch or more of precipitation per year), fugitive dust emissions probably would be significantly less than average for this phase of the project.

In addition, dust would be generated by vehicle movement on unpaved roads and other exposed surfaces, involving pulverization and abrasion of the surface materials by the vehicles' wheels followed by entrainment of the dust particles by turbulant air currents. The rate of emission has been found by field studies to be proportional to the amount of vehicle transit on these surfaces, the silt content of the surface material, and the speed of travel.(3) Since the redevelopment project would involve large tracts of cleared land that would be unpaved and exposed, and vehicular traffic would, at times, be constant, potential problems could develop, although the generally low speeds of the vehicles on-site, together with the factors noted in the preceeding paragraph, should minimize these problems.

The above analysis assumes no control of dust during demolition and construction operations. With the use of extensive or continuous wetting (use of water spray) throughout the demolition and rubble-removal process, however, dust levels can be reduced by as much as 80%. Average control (intermittant wetting, with the most intensive wetting occurring during the actual razing of a structure) can result in a 50% reduction of dust generation. Fugitive dust from land clearance, grading, and excavation activities can be controlled by watering down of the exposed ground area and by chemical stabilization methods, such as the application of calcium chloride. According to EPA studies,(3) twice daily watering with complete coverage can reduce dust emissions by up to 50%. Chemical stabilization, which is not effective in reducing dust generation caused by construction equipment traffic on exposed ground or by actual excavation and cut-and-fill operations, may be used most effectively on completed excavations or graded sites. However, chemical stabilization may be costly, contaminate the treated soil, and have adverse impacts on plant and animal life. Furthermore, dust from trucks loaded with demolition debris or excavated material can be controlled by spraying when necessary and by covering the loads. All trucks leaving the site also should be hosed and washed clean of mud and dirt clinging to the wheels and exterior body surfaces, to prevent mud and dust from being carried onto adjacent streets.

Although the values indicated above are high, even with extensive control, the significance of the impact would be tempered by several considerations. The Boston demolition study found that approximately 90% of demolition-generated particulate matter settled to the ground in the immediate vicinity of the demolition site and was not dispersed into the atmosphere, the dust plume created generally being impeded both horizontially and vertically by the presence of neighboring buildings. Thus the greatest impact would be confined generally to receptors in the vicinity of the demolition activities and most likely would involve the soiling of exterior surfaces. Moreover, evaluation of particle size indicated that only 10% of the particulates were 10 microns or smaller in diameter, which size is respirable and thus could be hazardous to human health. The same characteristics would apply equally to fugitive dust from site preparation activities.

Some additional particulate matter would be generated as a result of the actual construction process itself. The amount that might be produced cannot be accurately estimated but is expected to be considerably less than that resulting from demolition and site preparation activities.

Asbestos, which has been found to be extremely dangerous to health, possibly may be present in a friable, or free-floating, state as insulation or fire-proofing material in some of the buildings planned for demolition. Where present, compliance with procedures outlined in the National Emission Standards for Asbestos* will be required in contract specifications to minimize any potential adverse impacts.

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* 40 CFR Part 61.20 et seq.

Air quality also would be impacted by increased emissions from heavy- and light-duty trucks, from gasoline- and diesel-powered construction machinery, and from asphalt paving operations. These equipment would generate primarily carbon monoxide, hydrocarbons, and nitrogen oxides, with lesser amounts of sulfur oxides and particulates (see Table VI.H-1). The rate of emission is a function of the size of the engine and the load on the engine. Expressed in terms of emissions per unit amount of fuel consumed, the gasoline engine typically produces some 40 times as much carbon monoxide as the diesel. The diesel engine, on the other hand, produces approximately five times the amount of nitrogen oxides. Since construction schedules are not available for the project area's development, total emissions of these pollutants cannot be estimated at this time; however, they would be added to the existing high levels, particularly of carbon monoxide, found in the project area and vicinity. These emissions can be reduced by restricting the idling of trucks and equipment when not in use.

The paving of project area streets, assuming bituminous concrete (asphalt cement) is used, would produce minor amounts of nonmethane volatile organic compounds (VOC) emissions, which may contribute to the formation of photochemical oxidants in the atmosphere. Based on EPA studies, (4) VOC emissions from fresh-laid asphalt cement for the new and reconstructed roadways for this project would be generated at a rate of 0.04 ug/g-min.* Daily emissions would be dependant on the amount of road surface laid during a particular day. Residual, but low-level, organic emissions would be released from the asphalt pavement for up to four years (at an emission rate of generally less than 0.002 ug/g-min). Long-term cumulative loss of organics is estimated at 0.4% of the asphalt weight, without aggregate, or for the total North Station project, approximately 3,850 kg (reduced by an estimated 23% for the optional reduced-scale project).

Finally, increased CO emissions also can be attributed to automobile traffic related to the transport of construction workers to and from the site and to the potential disruption of existing traffic, including reroutings and slow-downs associated with detours, by the construction activity. However, increase in emissions due to construction workers' cars is not expected to be significant when compared to the emissions from the total traffic in the project area. Moreover, much of the CO is generated by the arterial traffic, which would not require rerouting except for a short time in the Leverett Circle area. (DPW improvements, if implemented, would substantially increase disruption and the need for temporary alternate routes.)

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* Based on an asphalt cement composition having an average of 6% asphalt by weight.

Table VI.H-1

Emission Factors for Heavy-Duty Construction Equipment[1]

(1) Gasoline-Powered Equipment (lbs/hr)

	Wheeled Tractor (740)[2]	Motor Grader (830)	Wheeled Loader (1140)	Roller (740)	Miscellaneous (1000)
CO	9.52	12.1	15.6	13.4	17.0
HC	0.502	0.5579	0.7025	0.7952	0.728
NO_x	0.430	0.320	0.518	0.362	0.412
SO_x	0.0155	0.0167	0.0234	0.0185	0.0234
TSP	0.0240	0.0207	0.0298	0.0260	0.0258

(2) Diesel-Powered Equipment (lbs/hr)

	Tracklaying Tractor (1050)[2]	Wheeled Tractor (740)	Wheeled Dozer (2000)	Scraper (2000)	Motor Grader (830)
CO	0.386	2.15	0.739	1.46	0.215
HC	0.110	0.148	0.234	0.626	0.054
NO_x	1.47	0.994	5.05	6.22	1.05
SO_x	0.137	0.090	0.348	0.463	0.086
TSP	0.112	0.136	0.165	0.406	0.061

	Wheeled Loader (1140)[2]	Tracklaying Loader (1100)	Off-Highway Truck (2000)	Roller (740)	Miscellaneous (1000)
CO	0.553	0.160	1.34	0.184	0.414
HC	0.187	0.032	0.437	0.054	0.157
NO_x	2.40	0.584	7.63	1.04	2.27
SO_x	0.182	0.076	0.454	0.067	0.143
TSP	0.172	0.058	0.256	0.050	0.139

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[1] U.S. Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Third Edition (Including Supplements 1-7) (Publication No. AP-42), Research Triangle Park, August 1977, Tables 3.2.7-1 and 3.2.7-2.

[2] Numbers in parentheses indicate annual equipment operation, in hours.

2.2 Emission Burden (Macroscale) Analysis

Estimated carbon monoxide (CO) emissions from various sources within the North Station area are presented for all of the alternatives in Table VI.H-2. Emissions from the No-Build Alternative are estimated to decrease by 47% from existing conditions to 1987, an improvement attributable to the anticipated decreases in automobile emissions as a result of the Federal Motor Vehicle Control Program (FMVCP). Total CO emissions are expected to decrease further by the year 2000 by 23% from the 1987 emissions. In all of the cases examined, the arterials are the major sources of CO, contributing typically about 70% of the total emissions. CO emissions from the parking facilities and from the trains would not be significant.

In 1987, CO emissions from traffic generated by either of the alternative development schemes for Phase I (office development vs. hotel development) were estimated to be higher than the corresponding no-build emissions by 11% and 9%, respectively. Compared with 1980 emissions, however, emissions from either option were projected to be considerably lower. From 1987 to 2000, there is estimated to be a further reduction in CO of 14.0% for the Preferred Alternative and 19.7% for the Optional Alternative,* although these emissions would be higher than the corresponding no-build emissions in 2000. Overall, the decrease in CO emissions from existing conditions by the year 2000 would be 49.2% and 52.5%, respectively, for the Preferred and Optional alternatives.

Carbon monoxide emissions from the commuter trains (which, being diesel, emit significantly lesser amounts of CO) also were estimated, and the results indicated that they would contribute approximately 1% of the total emissions for each alternative. There was no variation among the alternatives.

Table VI.H-3 sets forth the NO_x emissions inventory for the various alternatives. Emissions are projected to decrease from the 1980 levels to the 1987 no-build alternative by about 22%, and to decrease by an additional 16% for the 2000 no-build alternative. Even with implementation of the various project alternatives, total NO_x emissions were projected to decrease from the 1980 baseline level over time. By 2000, emissions from the Preferred Alternative were estimated to decrease by 30.6% from current levels and by 32.5% with the Optional Alternative. Differences in emissions between the build and the no-build alternatives were found to be small, ranging from 4% in 1987 to 7% in 2000.

Estimates of NO_x emissions from the trains indicate that they would contribute a substantial proportion of the total NO_x emissions in the area, ranging from 21% to 27%. The NO_x emissions from trains would not vary from alternative to alternative.

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* Based on implementation of the office development in Phase I. If the hotel option is developed in Phase I, CO emissions would be slightly lower in 2000 (by approximately 2%).

TABLE VI.H-2: TOTAL CARBON MONOXIDE EMISSIONS FROM NORTH STATION AND IMMEDIATE VICINITY FOR A 24-HR PERIOD, IN KG.

Analysis Year, and Alternatives	Source Categories				
	Expressways	Arterials	Parking	Trains	Total
1980					
Baseline	4261	8281	334	54	12930
1987					
No-Build	1867	4759	200	58	6884
Scheme I	1873	5403	304	58	7638
Scheme II	1873	5265	304	58	7500
2000					
No-Build	1367	3710	164	60	5301
Preferred*	1372	4855	278	60	6565
Optional*	1370	4456	251	60	6137

TABLE VI.H-3: TOTAL OXIDES OF NITROGEN EMISSION FROM NORTH STATION AND IMMEDIATE VICINITY FOR A 24-HR PERIOD, IN KG.

Analysis Years, and Alternatives	Source Categories				
	Expressways	Arterials	Parking	Trains	Total
1980					
Baseline	425	265	5	133	828
1987					
No-Build	297	202	4	140	643
Scheme I	298	226	6	140	670
Scheme II	298	222	6	140	666
2000					
No-Build	238	153	4	145	540
Preferred*	239	185	6	145	575
Optional*	238	171	5	145	559

TABLE VI.H-4: NONMETHANE HYDROCARBON EMISSIONS FROM NORTH STATION AND IMMEDIATE VICINITY FOR A 24-HR PERIOD, IN KG.

Analysis Years, and Alternatives	Source Categories				
	Expressways	Arterials	Parking	Trains	Total
1980					
Baseline	352	506	19	29	906
1987					
No-Build	113	246	10	31	400
Scheme I	114	278	15	31	438
Scheme II	114	271	15	31	431
2000					
No-Build	63	143	6	32	244
Preferred*	63	184	10	32	289
Optional*	63	169	9	32	273

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* Based on Scheme I development for 1987

Source: Bolt Beranek and Newman, Inc., Report No. 4477

Nonmethane hydrocarbon (NMHC) emissions were estimated for each of the alternatives and are presented in Table VI.H-4. Total emissions decrease by 56% from existing conditions to the 1987 No-Build Alternative, and by another 39% from 1987 to the year 2000. The overall reduction in emissions from 1980 to the 2000 No-Build Alternative is estimated to be 73%.

Compared with 1980 conditions, NMHC emissions from all of the build alternatives exhibit significant decreases - ranging from 52% in 1987 to 70%-73% in 2000 (as with the other pollutants, the reductions would be slightly greater in 2000 if the hotel option were developed in Phase I). Compared with the No-Build Alternative, however, NMHC emissions from the Phase I development would be 10% (office option) and 8% (hotel option) higher in 1987. Similarily, in 2000, the emissions from the Preferred and the Optional alternatives (with a Phase I office development) would be respectively 18% and 12% higher than the corresponding no-build emissions. This increase in emissions of the build alternatives over the no-build is attributed primarily to the additional traffic on local streets and arterials.

NMHC emissions from the commuter trains were estimated to contribute about 3% of the total 1980 emissions, and were anticipated to increase to between 7% and 8% in 1987 and between 11% and 13% in 2000.

According to criteria contained in the Massachusetts State Implementation Plan (Appendix J, Transportation Project Level Guidelines, pg. 3) "hydrocarbon emissions from the preferred alternative [of a proposed project] should be less than those from the no-build case in both the short and long term." Further, "in cases where hydrocarbon emissions from the preferred alternative are greater, then all reasonable and feasible hydrocarbon reduction/ mitigation measures shall be included."

As the above macroscale analysis indicates, NMHC emissions from the preferred alternative would be somewhat higher than emissions from the no-build condition in both 1987 and 2000 and thus would be inconsistent with the Massachusetts SIP. In accordance with the requirements of the State's project-level criterion for consistency determination with the SIP, several mitigation measures from other projects in the existing Transportation Improvement Program element of the SIP are identified below (for a more detailed evaluation, see response #1 to the DEQE comments in Part VIII of this Final EIR/ EIS).

(1) Improvements to mass transit services to encourage greater use of public transportation facilities, including upgrading of the Green Line elevated at North Station; integration of the Green Line, the Orange Line, and commuter rail facilities at North Station to facilitate intermodal transfers; and new and expanded park/ride facilities at outlying MBTA stations.

(2) Completion of highway projects, such as the North Area project in the City Square area of Charlestown and widening of the Central Artery, to reduce congestion on the major arterials.

(3) Traffic flow improvements, including elimination of on-street parking in the vicinity of major intersections and signal phasing adjustment (Cambridge and Staniford Streets, Leverett Circle).

(4) Implementation of the Inspection/Maintenance Program.

(5) Establishment of carpooling and vanpooling, as anticipated at the new Federal Office Building.

(6) Establishment of variable work hours to reduce peak-hour congestion.

2.3. Future Carbon Monoxide Concentrations

Future carbon monoxide concentrations at selected receptors in the North Station area were estimated to determine the impact on air quality of traffic pattern and volume changes resulting from the proposed redevelopment project. Using the modelling approach described in Appendix N, maximum 1-hour and 8-hour CO concentrations at the receptors were predicted for no-build conditions in 1987 and 2000, for the two Phase I development alternatives* in 1987, and for the Preferred and Optional alternatives (based on implementation of the Scheme I development in Phase I) in 2000. The receptor locations are indicated on Figure V-23 and are the same sites where existing (1980) conditions were estimated. The results of the modelling predictions are shown on Tables VI.H-5 and VI.H-6 together with the 1980 estimates for comparison.

The emissions from motor vehicle sources were estimated by using factors as compiled in EPA's MOBILE 2 program.(5) These emission factors were made more specific to the North Station analysis by applying a number of correction factors to the imput data, as described in Appendix N. A credit was taken for the implementation of an Inspection and Maintenance Program by 1983, which assumed a mechanics training program and a stringency level for the inspection of 20%. The ambient CO concentrations caused by the motor vehicles were estimated from the Federal Highway Administration's CALINE 3 Model.(6)

According to the BBN analysis, no exceedance of the 1-hour CO standard was predicted in 1987 or 2000 for any of the no-build or build alternatives and only one violation of the 8-hour standard - at a Keany Square receptor - was estimated, for the year 1987.**

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* Scheme I represents the office development proposal on the North Station/Boston Garden site and Scheme II represents the hotel development option.

** This was a significant revision of the preliminary finding reported in the 1980 Interim EIR, which was based on a different traffic circulation scheme and an earlier modelling analysis which tended to overpredict concentrations.

TABLE VI.H-5: MODELING PREDICTIONS OF MAXIMUM 1-HOUR CARBON MONOXIDE CONCENTRATIONS* FOR VARIOUS ANALYSIS YEARS AND PROJECT ALTERNATIVES AT SELECTED RECEPTOR LOCATIONS AT NORTH STATION.

	1980	1987			2000		
Receptor Locations	Baseline	No-build	Scheme I	Scheme II	No-build	Preferred†	Optional†
1. Canal and Causeway Monitoring Site - 2nd Floor	21.7	12.5	12.8	12.4	8.8	10.1	9.6
2. Canal and Causeway Monitoring Site - 4th Floor	16.7	8.9	9.3	9.0	6.3	7.2	7.0
3. Causeway at North Station	15.6	8.0	8.4	8.4	5.7	6.6	6.3
4. Friend and New Chardon	20.1	13.1	13.9	13.2	11.1	12.9	12.2
5. New Chardon and Merrimac	21.3	12.0	12.9	12.5	9.6	12.4	11.4
6. New Chardon and Garage entrance	11.0	5.6	6.2	6.1	4.1	5.0	4.7
7. Causeway, EB and Washington	40.3	18.7	21.3	20.6	13.5	16.7	15.5
8. N. Washington, NB and Causeway	35.4	14.3	18.3	18.1	11.5	14.2	14.0
9. Causeway, WB and N. Washington	29.8	13.5	15.9	15.9	9.9	11.6	11.4
10. Staniford and Merrimac	17.9	9.9	14.9	12.8	6.9	14.0	12.9
11. Merrimac and Causeway	15.3	6.8	12.5	10.6	5.2	11.6	10.7
12. Lomasney Way and Causeway	13.1	6.1	12.3	9.3	4.5	10.3	9.6
13. Leverett Circle - Nashua St.	17.9	10.0	11.1	10.6	7.9	10.6	9.8
14. Leverett Circle - Martha Way	22.2	12.9	14.1	13.8	11.3	14.4	12.4
15. Leverett Circle - Charles River Dam	23.4	12.5	13.5	13.4	9.1	13.4	12.7
16. Leverett Circle - Charles St.	23.1	12.1	13.3	12.8	9.3	11.6	10.5
17. Leverett Circle - Charles River Park Apartments	14.3	8.0	8.6	8.4	6.7	8.4	7.3
18. West End Project	10.7	4.6	5.3	5.2	3.3	5.0	4.5
19. Lomasney Way	10.9	5.2	9.1	7.1	3.6	7.1	6.6
20. Mass. Rehab. Hospital	11.7	5.4	5.5	5.5	3.6	4.5	4.5
21. Project Area, Sub Area II	14.3	6.7	7.0	7.0	3.8	4.5	4.5
22. Project Area, Public Area Near River	19.4	8.5	9.0	9.0	5.7	6.6	6.3
23. N. Washington Street and Thatcher Court	19.1	8.6	8.8	8.7	5.7	6.8	6.4
24. Martha Road - Amy Court	19.4	8.7	10.5	10.1	6.0	7.9	7.4
25. Project Area, by Canal near Museum/Park	20.4	8.6	9.4	9.4	6.1	7.0	6.8

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* Concentrations are given in parts per million (ppm). The 1-hr standard is 35 ppm. All entries include background CO.

† Based on Scheme I development for 1987.

Source: Bolt Beranek and Newman, Inc., Report No. 4477

TABLE VI.H-6: MODELING PREDICTIONS OF MAXIMUM 8-HOUR CARBON MONOXIDE CONCENTRATIONS* FOR VARIOUS ANALYSIS YEARS AND PROJECT ALTERNATIVES AT SELECTED RECEPTOR LOCATIONS AT NORTH STATION.

	1980	1987			2000		
Receptor Locations	Baseline	No-build	Scheme I	Scheme II	No-build	Preferred†	Optional†
1. Canal and Causeway Monitoring Site - 2nd Floor	12.1	6.6	6.5	6.3	4.1	4.5	4.5
2. Canal and Causeway Monitoring Site - 4th Floor	9.4	4.5	4.8	4.7	2.9	3.4	3.4
3. Causeway at North Station	8.9	4.5	4.8	4.8	3.2	3.4	3.4
4. Friend and New Chardon	11.4	7.0	7.7	7.4	5.9	6.2	6.2
5. New Chardon and Merrimac	11.4	6.3	7.0	6.6	5.2	5.9	5.6
6. New Chardon and Garage entrance	6.4	3.3	3.6	3.6	2.3	2.5	2.5
7. Causeway, EB and Washington	21.8	10.3	10.8	10.8	6.8	7.4	7.4
8. N. Washington, NB and Causeway	17.2	7.5	8.3	8.3	5.5	6.2	6.2
9. Causeway, WB and N. Washington	14.8	6.6	7.5	7.5	4.4	5.0	5.0
10. Staniford and Merrimac	10.9	5.6	7.4	6.6	3.8	7.0	6.7
11. Merrimac and Causeway	9.1	4.3	7.7	6.6	3.4	7.1	7.1
12. Lomasney Way and Causeway	8.4	4.7	7.0	5.8	3.4	6.4	6.2
13. Leverett Circle - Nashua St.	11.2	6.2	6.3	6.0	4.5	5.9	5.7
14. Leverett Circle - Martha Way	12.7	7.3	7.7	7.5	5.9	7.5	6.8
15. Leverett Circle - Charles River Dam	13.6	6.8	7.3	7.1	5.2	7.0	6.8
16. Leverett Circle - Charles St.	12.5	5.1	5.6	5.6	3.7	4.7	4.5
17. Leverett Circle - Charles River Park Apartments	8.4	4.5	4.7	4.7	4.0	4.5	4.4
18. West End Project	6.1	2.3	2.8	2.6	1.2	2.0	1.9
19. Lomasney Way	7.6	3.3	5.3	4.5	2.5	4.1	4.0
20. Mass. Rehab. Hospital	6.4	2.9	3.0	2.9	2.0	2.6	2.6
21. Project Area, Sub Area II	7.5	3.6	3.8	3.6	2.0	2.6	2.6
22. Project Area, Public Area Near River	9.5	4.3	4.5	4.5	2.7	3.2	3.2
23. N. Washington Street and Thatcher Court	9.9	4.1	4.8	4.8	2.9	3.4	3.4
24. Martha Road - Amy Court	10.6	4.3	5.0	5.0	2.6	3.5	3.5
25. Project Area, by Canal near Museum/Park	8.9	4.5	4.5	4.5	2.6	2.9	2.9

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* Concentrations are given in parts per million (ppm). The 8-hr standard is 9 ppm. All entries include background CO.

† Based on Scheme I development for 1987.

Source: Bolt Berenek and Newman, Inc., Report No. 4477

For each of the alternatives and future analysis years, the highest concentrations were predicted at receptors at the intersections of Causeway and North Washington Street, at Leverett Circle, at Lowell Square, and at New Chardon/ Merrimac/Friend Streets. The analysis also showed that CO concentrations estimated for each alternative would decrease with time (with one exception), an improvement attributable to both the Federal Motor Vehicle Control Plan (FMVCP) and implementation in Massachusetts by 1983 of an Inspection/ Maintenance (I/M) Program. In addition, the analysis showed that for each analysis year, the No-Build alternative generally would result in the lowest CO concentration, although in the majority of instances the differences between the no-build and build alternatives would be small.

The highest 1-hour concentration in the future was estimated for a receptor at Causeway and North Washington Streets (Receptor No. 7) in 1987, under Scheme I, where the prediction of 21.3 ppm would be about 61% of the corresponding standard. The highest future 8-hour concentration also was predicted for 1987 for the same Causeway/ North Washington Streets receptor, for both Scheme I and Scheme II. The estimated concentration here of 10.8 ppm would represent approximately 120% of the 9 ppm standard.

For the 1987 analysis year, implementation of Scheme II (the hotel option) would result in either lower or the same concentrations as Scheme I (the office building option) at each of receptors analyzed for both the 1-hour and the 8-hour analysis periods (see Tables VI.H-5 and VI.H-6). For both schemes, the highest concentrations were predicted at Receptor 7. In the year 2000, the Optional development program was predicted to result in lesser 1-hour concentrations than the Preferred development program at nearly all receptor locations (at two locations, the concentrations were predicted to be the same). The highest predicted concentrations under the Preferred Alternative was 16.7 ppm (48% of the standard) at Causeway/North Washington Streets and 15.5 ppm (44% of the standard) at the same location under the Optional Alternative. However, for the 8-hour period, the Optional program was estimated to produce lower concentrations at only 10 of the 25 receptor locations and the same at the remainder. Under the Preferred Alternative, the highest 8-hour concentration was predicted at Receptor No. 14 (Leverett Circle-Martha Way), where 7.5 ppm (83% of standard) was modelled. The highest concentration under the Optional Alternative - 7.4 ppm (82% of standard) - was predicted at Receptor 7.

It also should be noted that since the Year 2000 analysis was based on a "worst-case" traffic generation scenario (resulting from implementation of the office development option in Phase I of the project), construction of a hotel rather than an office building in Phase I would result in a lower volume of traffic overall in 2000 (see Section C.1.3 supra) and thus could result in slightly lesser concentrations of carbon monoxide at the several receptors. However, since no exceedences of the standard were predicted for any of the future analysis years (except for the one Keany Square receptor in

1987, at which violations would occur under both options), from an air quality standpoint there would appear to be no substantial advantage of implementing one development alternative in Phase I over the other.

Although air quality standards are not expected to be violated as a result of the proposed redevelopment project (with the one exception for 1987), there are, however, certain mitigating factors that could reduce future concentrations even further. Roadway and circulation improvements, such as changes in geometry and lane usage at critical intersections and changes in traffic signal cycle length, and the implementation of operational improvements could have a positive effect of improving local traffic flow and reducing projected congestion problems, thus increasing future levels of service. Secondly, the completion of proposed major highway improvement projects, including the reconstruction of the I-93/Tobin Bridge interchange in Charlestown and widening of the Central Artery, is expected to reduce the numbers of vehicles using the local streets as a by-pass route, thereby taking some pressure off the intersections in the area. (See Part VI.C.1.5 for commitments of the City to the implementation of mitigation measures.)

2.4 Access Roadway Analysis

The proposed access/service roadway servicing the parking garages and Arena in Sub-area I will be mainly located under structures or in a tunnel segment beneath the commuter rail platform and will require ventilation to bring in fresh air and to exhaust the vehicular-generated pollutants. Since this roadway has not as yet been definitively engineered, it was concluded, in consultation with the MEPA office, the EPA, and the DEQE, that an air quality modelling would not be appropriate at this time but that a detailed analysis would be performed when the design of the roadway was better defined. At the same time, a preliminary investigation of the ventilation requirements of the roadway segment (and underground garage section) was undertaken for this Final EIR/EIS by C.E. Maguire, Inc., and a copy of this report is included as Appendix O.

In summary, Maguire concluded that the roadway tunnel section will require 180,000 CFM of air and the Arena garage, 200,000 CFM with 6 air changes per hour. A semi-transverse system, where the exhaust (probably incorporated into the garage exhaust system) would be located near the center of the tunnel, on the southerly side, and which would utilize the tunnel portals as intakes, was recommended. For the garage, fresh air would have to be brought in from a point high above the ground level in order to avoid the partially contaminated air at street level. Similarly, the exhaust would have to be discharged as high as possible to ensure dispersion and avoid compounding the potential contamination at street level. Maguire also concluded that the area of the access road under the arcaded portion of the proposed parking garage behind the GSA building would not require mechanical ventilation since the garage is planned to be a conventional, open-frame, structure allowing adequate air distribution.

2.5 Point Source Analysis - Diesel Exhaust

Exhaust emissions from diesel engines generally contain the same pollutants as gasoline engine exhaust. However, the concentrations of some of these pollutants and the chemical make-up of some of their components can be quite different. The hydrocarbon (HC) and carbon monoxide (CO) emissions from diesel engines are lower than those from their gasoline counterparts, whereas nitrogen oxide (NO_x) and particulate (TSP) emissions are significantly greater. There is increasing concern over new toxicity data related to diesel exhaust particulates. These data point to the presence of polynuclear aromatic hydrocarbons in the particulates, which is a suspected carcinogen.

Diesel exhaust also is noted for its distinct and offensive odor. The odor character generally can be described by two main components: kerosene and smoky-burnt, oxidized oil. Threshold concentrations for human detections of the kerosene fractions are generally in the range of 20 to 300 micrograms per cubic meter (ug/M^3) and for oxygenated fractions, in the range of 0.1 to 12 ug/M^3.

The Urban Renewal Plan proposes to cover the train tracks within the project area. This would require adequate ventilation to ensure that the concentrations of the toxic particulates and the odorants inside the covered section are reduced to the minimum level that is practically achievable. However, the impact of diesel locomotive particulate emissions and the odor ramifications associated with covering the tracks is difficult to quantify, due to the absence of reliable emissions data and prediction techniques. Consequently, criteria levels relating to nitrogen dioxide (NO_2) were used by BBN in assessing ventilation requirements and the related impact on the ambient environment.

NO_x emissions within the covered section of the tracks were estimated based on peak-hour train volumes and average idling times provided by the MBTA.(7) For this particular assessment, the GM F40PH locomotive was used to represent the locomotive population, and emission factors were taken from the EPA's AP-42 document.(3) This factor was multiplied by a load factor of about 6% to estimate the emissions during the idling mode. The estimated emission rate during the peak hour was calculated at 3.75 grams per second (g/sec) in 1980, 7.5 g/sec in 1987, and 8.5 g/sec in 2000.

To determine the ventilation requirements for the covered section of the tracks, a number of considerations were taken into account to formulate two ventilation scenarios for further analysis of impact on the ambient environment. All of these considerations relate to NO_2 only. The considerations included:

- The ASHRAE* guidelines for general (garage) ventilation of four air changes per hour

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* ASHRAE is the American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.

- The ACGIH* short-term exposure limit of 5 ppm, or 9.4 milligrams per cubic meter (mg/m^3).

From these considerations and the emission rates, a set of ventilation parameters was estimated for the purpose of assessing the impact both within the covered air-rights structure and in the surrounding ambient environment. These parameters are exhibited in Table VI.H-7. To satisfy the ASHRAE guideline, about 180,000 cubic feet per minute (cfm) of air would be needed. This ventilation rate, however, was estimated to result in an unacceptably high level of NO_2 in the covered section. To achieve a NO_2 ceiling of 9.4 mg/m^3, the ventilation rate - with a 7.5 g/sec emission rate - would have to be increased nine times. Ventilation requirements to achieve a 9.4 mg/m^3 limit in 2000 was estimated at almost two million cfm. These estimates do not reflect background NO_2 that are usually present in the make-up air in varying amounts.

To estimate the impact of the vented emissions on ambient air quality, an empirical algorithm describing dilution of exhaust concentrations in a near-field environment was used. This algorithm was based on Halitsky's method (8) and is further described in Appendix N. Because the exact location of the vents and other technical specifications relating to the ventilation of the covered section are not presently defined, a total of six receptor locations were selected to represent the probable range of the impact and were grouped into three ranges of distances from the ventilation stacks. Within each range of distances, one receptor was located at roof top level (to represent air intake of an adjacent building), and the other was located at ground level (to represent concentration in the "cavity" of the exhaust plume).

The estimated maximum 1-hour NO_2 concentrations from the two ventilation scenarios for 1987 and 2000 are shown on Table VI.H-8. The range of concentrations indicated results from a range of rooftop wind speeds that were used in the estimation (1.5 knots and 5 knots). At the present time, there is no short-term standard for NO_2, although the EPA has proposed a 1-hour standard in the range of 0.47 to 0.94 mg/M^3. Compared to this proposed standard, it would appear that there could be a potential adverse impact at nearly all of the receptor locations, particularly the closer ones, depending on the wind speed and the standard ultimately selected. In several cases, estimated concentrations were considerably in excess of the upper limit of the recommended standard. In addition, Massachusetts has a policy guideline level of 0.32 mg/M^3, which is more stringent the EPA proposed standard. Therefore, the predicted concentrations, in most cases, are well in excess of the State's policy level as well. Because of the anticipated increase in emission rates between 1987 and 2000, the estimated 1-hour NO_2 concentrations in 2000 generally are worse than their 1987 counterparts.

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* ACGIH stands for the American Conference of Governmental Industrial Hygienists.

TABLE VI.H-7: NORTH STATION COVERED SECTION VENTILATION PARAMETERS.

Ventilation Scenario ID No.	Description of Ventilation Scenario	Analysis Year	Emission Rate (g/sec)	Maximum 1-hr Concentration in Covered Section (mg/m³)	No. of Air Changes Per Hour	Ventilation Rate (cfm)
1	Per ASHRAE Guideline of 4 Air Changes per hour.	1980	3.75	NA*	NA	NA
		1987	7.50	88.1	4	1.30 X 10^5
		2000	8.50	99.3	4	1.30 X 10^5
2	Per ACGIH Criterion of a maximum of 9.4 mg/m³ NO_2 in the covered section.	1980	3.75	NA	NA	NA
		1987	7.50	9.4	37.6	1.69 x 10^6
		2000	8.50	9.4	42.7	1.92 x 10^6

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* 1980 conditions are not applicable (NA)

Source: Bolt Beranek and Newman, Inc., Report No. 4477

TABLE VI.H-8: EFFECTS OF VENTED DIESEL EXHAUST EMISSIONS ON MAXIMUM 1-HR AMBIENT NITROGEN DIOXIDE LEVELS IN THE PROJECT AREA.

Analysis Year	Receptor Location	Receptor Distance to Stacks (ft)	Concentrations in mg/m³* for Ventilation Scenario #1	#2
1987				
	R1, Roof Top Vent	100 to 300	1.7 - 7.0	2.1 - 7.0
	R2, in "Cavity"	100 to 300	0.9 - 3.5	1.1 - 3.5
	R3, Roof Top Vent	200 to 600	1.0 - 4.0	1.2 - 4.0
	R4, in "Cavity"	200 to 600	0.5 - 2.0	0.6 - 2.0
	R5, Roof Top Vent	300 to 1000	0.4 - 1.5	0.5 - 1.5
	R6, in "Cavity"	300 to 1000	0.2 - 0.8	0.2 - 0.8
2000				
	R1, Roof Top Vent	100 to 300	2.0 - 7.9	2.4 - 8.0
	R2, in "Cavity"	100 to 300	1.0 - 4.0	1.2 - 4.0
	R3, Roof Top Vent	200 to 600	1.1 - 4.5	1.4 - 4.6
	R4, in "Cavity"	200 to 600	0.6 - 2.3	0.7 - 2.3
	R5, Roof Top Vent	300 to 1000	0.4 - 1.7	0.5 - 1.7
	R6, in "Cavity"	300 to 1000	0.2 - 0.9	0.3 - 0.9

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* Estimated concentrations are in milligrams per cubic meter (mg/m³). The proposed 1-hr standard is in the range of 0.47 to 0.94 mg/m³.

Source: Bolt Beranek and Newman, Inc., Report No. 4477

Because of the proximity of North Station to the ocean, shoreline fumigation - resulting from early morning bay breezes - potentially could lead to relatively high ground-level concentrations, even though the NO_2 is discharged from elevated stacks. Due to the absence of a reliable estimation procedure, however, the impact of shoreline fumigation could not be quantified at this time.

In addition, since currently there is no proposed design for the venting system, the potential impact of venting the diesel exhaust emissions on the air intakes of existing and proposed buildings likewise could not be determined. It is recognized, however, that problems could result, and these will be investigated in detail after venting design options have been identified. The analyses described above, then, are meant to be used in a "screening" context or first-order approximation. In a complex building geometry as would be encountered in the proposed project, these estimation algorithms generally are inadequate to quantify the impact accurately, requiring a physical modelling analysis. In any case, physical modelling will be done once detailed design data are available and concentration are reestimated, should the new analysis indicate a potential to exceed the State's less stringent 0.32 mg/M^3 policy level.

2.6 Green Line Relocation Options

The Green Line improvements would have little effect on regional or local air quality in the long-term, since the transit cars are electrically driven and emit no air pollutants directly. Neither the elevated nor the subway option would interfere with vehicular traffic flow (except during the construction period), thus making no permanent contribution to air quality degradation as related to increased vehicular emissions. On the contrary, general improvements in transit service should lead to increased ridership and a decrease in the use of the automobile. The net impact of this modernization would be a slight long-term decrease in the regional burden and an improvement in the majority of air quality parameters currently being degraded by vehichlar emissions.

Removal of the existing elevated structure over Causeway Street and Lomasney Way would increase air circulation and mixing on these streets and reduce street-level CO accordingly (the capping effect of the elevated structure having been demonstrated from the on-site monitoring program which showed street-level CO concentrations to be approximately one-third more than those measured above the structure). With the upgrading of the existing alignment option, there could be a slight improvement in localized air quality over the no-action alternative, since the less massive structure would reduce the levels of carbon monoxide and other pollutants which otherwise would be trapped by the existing structure; but the capping effect would not be entirely eliminated.

Although a relocated elevated alignment would occur above Accolon Way, thus trapping pollutants at street level, this roadway would be used only as a service drive and hence would not be subject to a large amount of traffic. A slight increase in pollutant levels, however, could be expected to occur here and could adversely impact the adjacent properties. The transition/elevated portion of the subway option would not provide a structural capping effect inasmuch as it would not follow any underlying street.

2.7 Storrow Drive Connector Relocation Options

On the whole, each of the several proposed DPW options for the Leverett Circle/Central Artery Connector improvements would probably result in some degradation of air quality in the project area.* The three bridge options would be expected to alleviate the present congestion at Leverett Circle - a beneficial impact - but a slight increase in vehicle emission rates could be expected since some of the connector grades would be in the range of 6-7%. The effect, however, might be modified somewhat because the pollution sources would be subject to some dispersion throughout the immediate atmosphere. Both alternatives 1 and 3, since neither would provide direct access between O'Brien Highway and I-93 North, the Tobin Bridge, and the Central Artery, could result in an increase of pollutant emissions on local streets in the project area. Alternative 4, however, would provide a full interchange at O'Brien Highway, giving direct access to the expressway system and thus avoiding resultant increases in pollutant emissions due to congestion on local streets.

The tunnel option (alternative 2) also would alleviate the Leverett Circle congestion and resultant pollution problems, but the lack of a direct access between O'Brien Highway and the expressway system could result in increased emissions on local streets. In addition, the tunnels would require a ventilation system consisting of a projected three ventilation stacks or buildings which would function as point sources emitting concentrated automobile exhaust pollutants. Moreover, all exit portals also would vent some degree of emissions, although none of these (nor the proposed ventilation buildings) would be expected to be sited near critical receptors.

2.8 Central Artery Depression

The proposed Central Artery depression likewise could result in some degradation in air quality in the immediate project area since the lower level of the new bridges over the Charles would cause the dispersal of pollutants nearer to the ground, particularly in the vicinity of the proposed pedestrian walkways along the river bank. Significant increases in traffic at Leverett Circle in the P.M. peak also would increase CO concentrations and could result in an exceedance of standards (although no violations were projected in the Third Harbor Tunnel/Central Artery Supplemental DEIS/EIR at the receptors analyzed, which were more distant from the intersection than the receptors analyzed in this present study, concentrations were within 90% of standard).

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* It should be noted that the traffic-related air quality analysis undertaken for the project area assumed the retention of the existing Storrow Drive Connector behind North Station and did not assume any future DPW improvements. Thus the impact of the DPW proposals must be added to that of the renewal plan development.

On the other hand, projected reductions in traffic volumes at major intersections and roadways, such as Keany Square and Causeway Street, would result in consideraly lesser pollutant emissions at these locations. As an example, a separate analysis by BBN of Keany Square for the year 2000, assuming the reconstruction of the Central Artery with additional lanes and an access ramp at Causeway Street, indicated a reduction in the 8-hour concentration of from 1.8 to 2.7 ppm. (As shown in Section 2.3, however, no violations were projected at Keany Square in 2000 even without the Artery widening.)

I. Noise Levels

1. Future Noise Level Predictions

1.1 Background

The proposed North Station Urban Renewal Project will affect community noise levels in three ways. First, it will alter existing patterns of street/expressway traffic, causing, for example, rerouting of existing traffic and/or generation of new traffic. Thus, noise levels generated by street/expressway traffic may change. Second, by relocating, refurbishing, covering, or moving to below surface portions of the commuter rail lines and the Green Line, it will alter the noise generated by these two sources. Third, it will introduce new noise sensitive land uses (housing and/or hotel rooms) to the area, thus potentially creating new areas of noise impact.

The proposed project does not introduce new types of noise sources to the area; it only alters existing noise sources. Because reliable models are available for computing the noise produced by the three main noise sources (road traffic, railline/rail yard activities, and Green Line operations), existing and future build and no-build noise levels at noise sensitive locations were readily estimated. Once the noise levels were estimated, both the changes in levels and the absolute values of the levels could be judged to determine whether a "noise impact" was likely.

1.2 Community Noise Standards

In order to assess noise impact, standards relating to community noise impact have been established by some governmental agencies. The Federal Highway Administration (FHWA) has adopted standards which are promulgated in their "Policy and Procedure Memorandum 90-2, Noise Standards and Procedures" (February 8, 1973). FHWA criteria specify various design noise level limits for highway noise during the noisest traffic hours in areas occupied or used by people. For commercial areas, the exterior L_{10} design noise level is 75 dB(A), and for hotels and residential areas, 70 dB(A).

The U.S. Department of Housing and Urban Development (HUD) has also established noise policy and criteria (24 CFR Part 51) to determine the acceptability of acoustic environments for Federally-assisted housing developments. According to the HUD criteria, an outdoor day-night sound level exceeding 65 dB at a noise sensitive location is judged as "normally unacceptable" for purposes of providing funding of projects.

The City of Boston Air Pollution Control Commission has promulgated regulations for the control of noise within the City. These regulations prohibit noise emissions at such levels as to cause a condition of noise pollution and restrict, among other things, noise emissions according to zoning district and from construction sites.

For residential districts, the maximum allowable noise level measured at the lot line of a residential use is 65 dB(A) during the daytime and 55 dB(A) at other times, and for a business district, 65 dB(A) at any time. Noise from construction activities in a residential district is not to exceed 75 dB(A) (L_{10}), measured at 50 feet from the nearest active construction device on the site, and in a business district, 80 dB(A) (impact devices are exempted from this regulation).

Finally, the Commonwealth of Massachusetts has a noise standard that basically consists of a prohibition of pure tone noise generation and of increases in ambient noise levels in excess of 10 dB(A).

1.3 Noise Impact Criteria

The noise impact of the proposed North Station redevelopment activities was assessed by Bolt Beranek and Newman, Inc., (BBN).(1) In order to determine whether a "noise impact" would occur, two types of criteria were used: one for judging changes in noise levels ("relative impact") and one for judging the absolute level of the noise ("absolute impact"). The values for judging impact were derived from widely accepted standards and criteria.

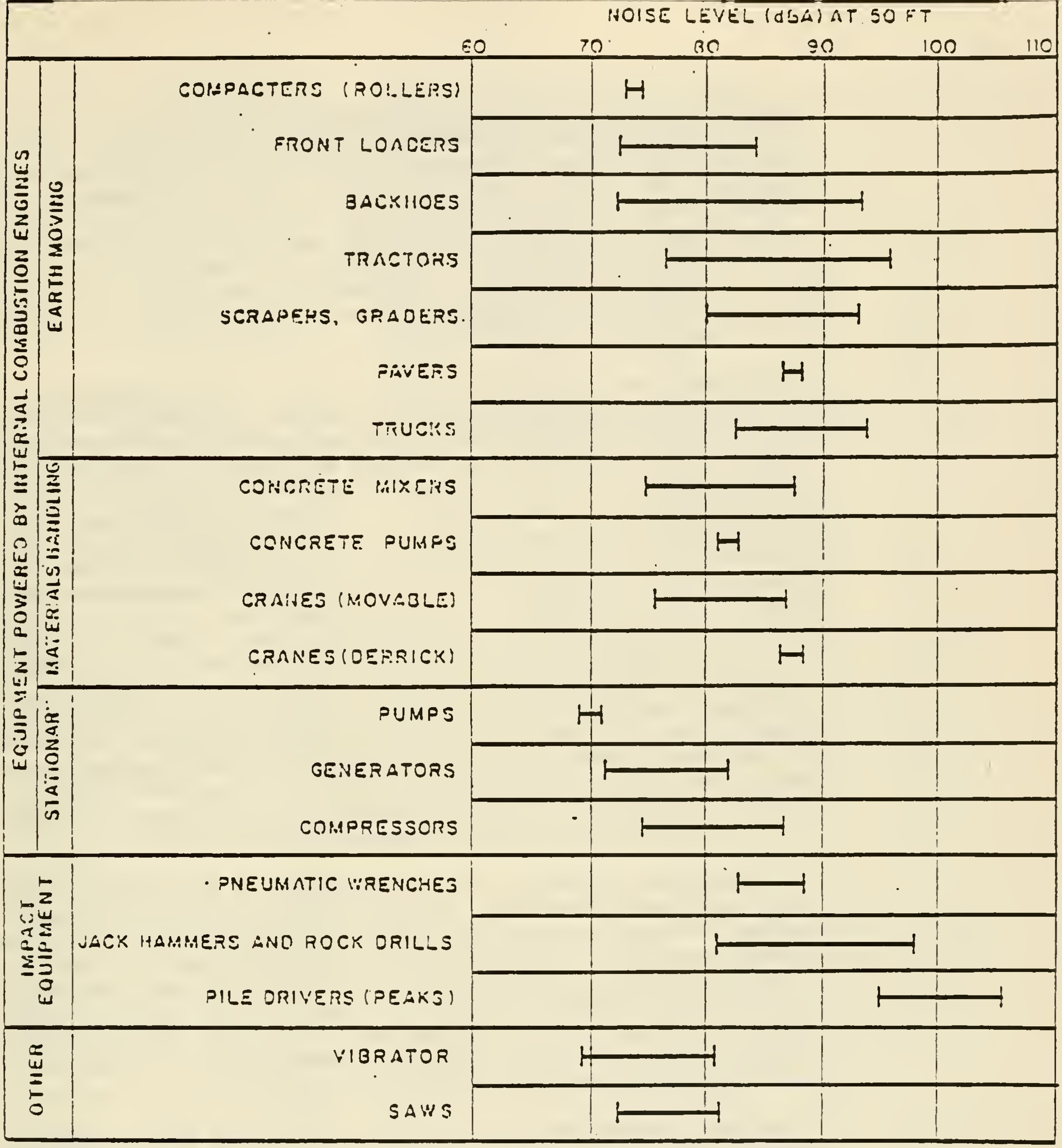
"Relative" noise impact occurs when the increase in L_{dn} equals or exceeds 5 dB, which is generally accepted as the minimum change necessary to produce a significant change in the general pattern of community reaction to noise. An "absolute" noise impact occurs when the value of L_{dn} exceeds 65 dB, the HUD level for determining the acceptability of a site for a noise-sensitive use.

2. Noise Impact Assessment

2.1 Construction Noise Impact

Short-term noise impacts will occur during the construction period of the proposed project developments, resulting from the demolition, site preparation, and construction activities. These impacts, however, would not occur at the same period of time but would be spread over the 15-20 years required to complete the project. Since construction schedules have not yet been developed for the elements of this project, only very general conclusions can be provided, based on available studies, to estimate the noise levels and impacts expected to be associated with the project's construction activity.

The ambient noise environment of the project environs will be affected by a noticeable increase in noise levels during the working hours from the various pieces of construction equipment and trucks, which produce fairly high levels of noise. Typical noise levels from various pieces of construction equipment are indicated on Figure VI.I-1 and range from 68 dB(A) to over 100 dB(A). The single noisiest piece of equipment is the pile driver, with peaks of 105 dB(A). Other loud pieces of equipment include diesel trucks, tractors, and pavement breakers. Although pile drivers and jack



Note: Based on Limited Available Data Samples

Figure VI.I-1: CONSTRUCTION EQUIPMENT NOISE RANGES.[1]

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[1] U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances (NTID 300.1), Dec. 31, 1971.

hammers are extremely noisy, they are generally prevalent only during the excavation and foundation phases whereas trucks, while somewhat less noisy, are present throughout the construction period. Moreover, the construction noise impacts would be mitigated to some extent by the relatively high ambient noise levels found in the project area (L_{dn}=72-76 dB(A)) and by the fact that the percentage of time the loudest devices are operating at the noisiest mode in the most used phase on-site is minimal (see Table VI.I-1). As a result, the impact of construction noises generated by the project would have limited significance.

Noise levels experienced during the construction of the North Station project elements would vary greatly during any one day and over the entire construction period, and would depend on the particular phase of construction, the type and number of equipment being used, the location of the equipment, and the average noise level. Maximum noise levels would occur if all equipment were operating simultaneously. In reality, however, all equipment would not be operating at one time, or near one point, and some pieces may be below grade or otherwise shielded. In addition, since sound relationships are logarithmic, two or more machines producing the same noise energy would add only 3 dB(A) each; and, if one noise source were much louder than the other, the lower one would not be heard or measured in the overall sound level. Moreover, continuous or semi-continuous operation of construction equipment allows individual noise sources to blend in with other on-going construction activity. Pile drivers, however, because of their intermittent generation of noise, are a more prominent noise source and therefore are more susceptible to disruption and annoyance. Typical ranges of noise levels at urban construction sites are given on Table VI.I-2.

For demolition equipment, field measurements in the City of Boston indicated ranges from 75 to 84 L_{eq} dB(A), measured at a distance of 50 feet. The major noise source was the engine noise of the crane or bulldozer under observation; other on-site noises included heavy trucks in low gear, falling debris striking the ground, and the crane clamshell bucket striking the structure.(2) However, demolition noise levels could be expected to be higher if a steel ball is used to demolish the buildings and when a ball or jackhammer is used to break up concrete floors and foundations.

Other than pile-driving operation, the excavation phases probably would produce the highest concentration of noise generation. This phase would be expected to require the greatest daily volume of trucks (to remove the excavated material) as well as other major noise-generating equipment, such as backhoes and front-end loaders. Noise levels associated with this period, based upon a mix of construction equipment, would result in maximum external noise levels of approximately 90 dB(A) at a distance of 50 feet from the noisiest piece of equipment (Table VI.I-2).

Table VI.I-1: USAGE FACTORS OF EQUIPMENT IN NONRESIDENTIAL CONSTRUCTION*[1]

Equipment†		Construction Phase				
		Clearing	Excavation	Foundation	Erection	Finishing
Air Compressor	[81]		1.0(2)	1.0(2)	1.0(2)	.4(2)
Backhoe	[85]	.04	.16			.04
Concrete Mixer	[85]			.4	.4	.16
Concrete Pump	[82]			.4	.08	.08
Concrete Vibrator	[76]			.4	.1	.04
Crane, Derrick	[88]				.16	.04
Crane, Mobile	[83]				.16(2)	.04(2)
Dozer	[80]	.16	.4			.16
Generator	[78]	.4(2)	1.0(2)			
Grader	[85]	.08				.02
Jack Hammer	[88]		.1	.04	.04	.04
Loader	[79]	.15	.4			.15
Paver	[89]					.1
Pile Driver	[101]			.04		
Pneumatic Tool	[85]			.04	.16(2)	.04(2)
Pump	[76]		1.0(2)	1.0(2)	.4	
Rock Drill	[98]		.04			.005
Roller	[74]					
Saw	[78]			.04(3)	1.0(3)	
Scraper	[88]	.55				
Shovel	[82]		.4			
Truck	[91]	.16(2)	.4			.16

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* Numbers in parentheses represent average number of items in use, if that number is greater than one. Blanks indicate zero or very rare usage.

† Numbers in brackets [ ] represent average noise levels [db(A)] at 50 ft.

[1] U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances (NTID 300.1), Dec. 31, 1971.

Table VI.I-2: TYPICAL RANGES OF NOISE LEVELS AT CONSTRUCTION SITES WITH A 70 dB(A) AMBIENT TYPICAL OF URBAN AREAS[1]

	Domestic Housing		Office Building, Hotel, Hospital School, Public Works		Industrial, Parking Garage, Religious, Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches		
	I	II	I	II	I	II	I	II	
Ground Clearing	84	83	84	84	84	87	84	84	Energy Average dB(A)
	6	8	6	8	6	8	6	7	Standard Deviation
	100	103	99	103	101	103	100	101	NPL
Excavation	88	76	89	79	89	74	89	79	Energy Average dB(A)
	7	5	6	2	7	1	6	2	Standard Deviation
	106	88	104	85	106	77	105	85	NPL
Foundations	81	81	78	78	78	78	88	88	Energy Average dB(A)
	7	7	3	2	3	3	8	8	Standard Deviation
	99	100	85	85	85	85	108	108	NPL
Erection	82	71	85	76	85	74	79	79	Energy Average dB(A)
	6	1	5	1	7	2	[illegible]	4	Standard Deviation
	97	75	97	79	103	80	88	88	NPL
Finishing	88	74	89	76	89	75	84	84	Energy Average dB(A)
	7	4	6	4	6	3	6	6	Standard Deviation
	106	84	104	86	104	84	100	100	NPL

I - All pertinent equipment present at site.

II - Minimum required equipment present at site.

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[1] U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances (NTID 300.1), Dec. 31, 1971.

As the discussion above indicates, both demolition and construction activities would produce noise levels greater than 5 dB(A) over ambient conditions. The nearest sensitive receptors would be the Amy Lowell Housing for the Elderly (approximately 200 feet from the nearest construction site) and the other residential structures in the Charles River Park complex and the Massachusetts Rehabilitation Hospital. The Charles River Park housing, however, would be shielded to some extent from the construction activity by nearby buildings and by the Expressway ramp systems adjacent to Martha Road, where high traffic noise levels also would tend to absorb the general construction noise. Under the Preferred development program, the Rehabilitation Hospital would be relocated prior to Phase II construction activity and therefore would not be affected. However, with the Optional program, which retains the hospital, this facility could be seriously affected by noise generation, particularly from the canal dredging and construction. Also affected by the construction noise would be the daily worker population in adjacent areas and the daily commuter population from North Station, the latter to a much lesser extent due to their short period of time in the area.

Noise levels of demolition and construction equipment can be reduced considerably by the use of commercially-available muffled equipment and by the installation of mufflers and housing on existing equipment. EPA studies have indicated possible reductions of from 1 to 18 dB(A), depending on the piece of equipment and the type of control used (see Table VI.I-3). Other studies indicate even further reductions are possible by using state-of-the-art abatement equipment, including a significant reduction in noise emitted by pile drivers, one of the loudest pieces of construction equipment which will be used on the site.

Other mitigation measures that can be employed to reduce excessive noise generation from construction activities include: 1) selecting the quietest of alternative items of equipment (e.g., hydraulic tools instead of pneumatic impact tools), 2) replacing individual operations and techniques by less noisy ones (e.g., using welding rather than riveting), 3) turning off idling equipment, and 4) scheduling equipment operations to keep average noise levels low, to keep noise levels relatively uniform in time, and to have the noisiest operations coincide with times of highest ambient levels. In addition, the construction of a solid wall noise barrier around the construction site, tall enough to block the view from ground floor windows to the ground level construction equipment, can reduce noise levels by 10 to 15 dB. While acoustically, noise barriers are probably the most feasible means for achieving reductions, they reduce noise only for those locations that are near enough to the ground to have their view of the construction equipment blocked by the barrier, since sound travels on a straight line.

For pile drivers, another quieting technique would be to auger holes for the piles to roughly half their final depth. Although this would not reduce the noise of the impacts, it would reduce the total

Table VI.I-3

SHORT TERM CONSTRUCTION NOISE EMISSIONS AND SUGGESTED MITIGATING MEASURES

Type Equipment	Typical Level in dBA, 50 ft	With Feasible Noise Control[1]	Type of Control Method[3]
Earthmoving			
Front Loader	79	75	AMB
Backhoes	85	75	AMB
Bulldozers	80	75	MB
Tractors	80	75	MB
Scrapers	88	80	M
Graders	85	75	M
Trucks	91	75	M
Pavers	89	80	M
Vibrator	76	75	MB
Materials Handling			
Concrete Mixer	85	75	MA
Crane	83	75	MA
Derrick	88	75	MA
Stationary			
Pumps	76	75	ABM
Generators	78	75	ABM
Compressors	81	75	ABM
Impact 2			
Pile Drivers	101	95	MB
Pavement Breakers	95	85	MB
Pneumatic Tools	86	80	MB

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[1] Estimated levels obtainable by selecting quieter procedures or machines and implementing noise control features requiring no major redesign or extreme cost.

[2] Impact equipment is exempted from Boston noise regulations.

[3] A Acoustic enclosure to reduce noise emission from casing.
M Muffler on engine exhaust or pneumatic exhaust.
B Barrier to screen public nearby from work area noise.

Source: U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances (NTID 300.1), Dec. 31, 1971.

number of pile impacts by approximately one-half. Whether or not this technique could be used would have to be determined by a soils or foundations engineer.

The implementation of the above-identified mitigation measures should sufficiently control noise from non-impact equipment to bring emission levels to below the 80 dB(A) limitation (L_{10}) for construction work in business districts, as required by the Regulations for the Control of Noise in the City of Boston of the Boston Air Pollution Control Commission.* Most measures also should be able to reduce levels economically to below 75 dB(A) for work in residential areas where applicable at the times of construction.

Also during construction, vehicular traffic patterns may be altered with some resulting congestion of flow. This would be particularly true with regard to street reconstruction work and the Green Line relocation project. However, this generally reduces the traffic level of service and, consequently, the vehicular speeds. Thus traffic noise often would be reduced during construction.

2.2 Project-Generated Noise Impacts

Traffic and Transportation-Related Sources

For future conditions resulting from vehicular traffic and other transportation sources, noise impact was assessed at eight selected noise-sensitive locations, identified in Figure VI.I-2, for the no-build, preferred development program, and optional (reduced-scale) alternative cases. The results of this analysis are summarized on Table VI.I-4.

In general, absolute impact was predicted to occur at all locations for both future years (1987 and 2000), for all build and no-build alternatives. The extent of this impact is not surprising, considering that the entire area is certainly a noisy urban area (see Table V-16).

On the other hand, no relative impact is expected, i.e., future build alternative noise levels were predicted to be less than 5 dB greater than existing levels. In fact, future build alternative day-night sound levels were within 1 dB of existing modelled levels except in the vicinity of Location 1, where Year 2000 build alternative noise levels were 8 dB to 11 dB lower than existing levels and 6 dB to 9 dB lower than no-build levels.**

The following paragraphs discuss the noise assessment results by location, and, when appropriate, suggest mitigating measures.

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* Regulation 3.1

** The future years build analyses were based on implementation of the higher traffic-generation alternative (Scheme I) in the Phase I development. However, the traffic volumes that would be generated by implementation of Scheme II would not be reduced significantly to an extent sufficient to affect vehicular noise levels.

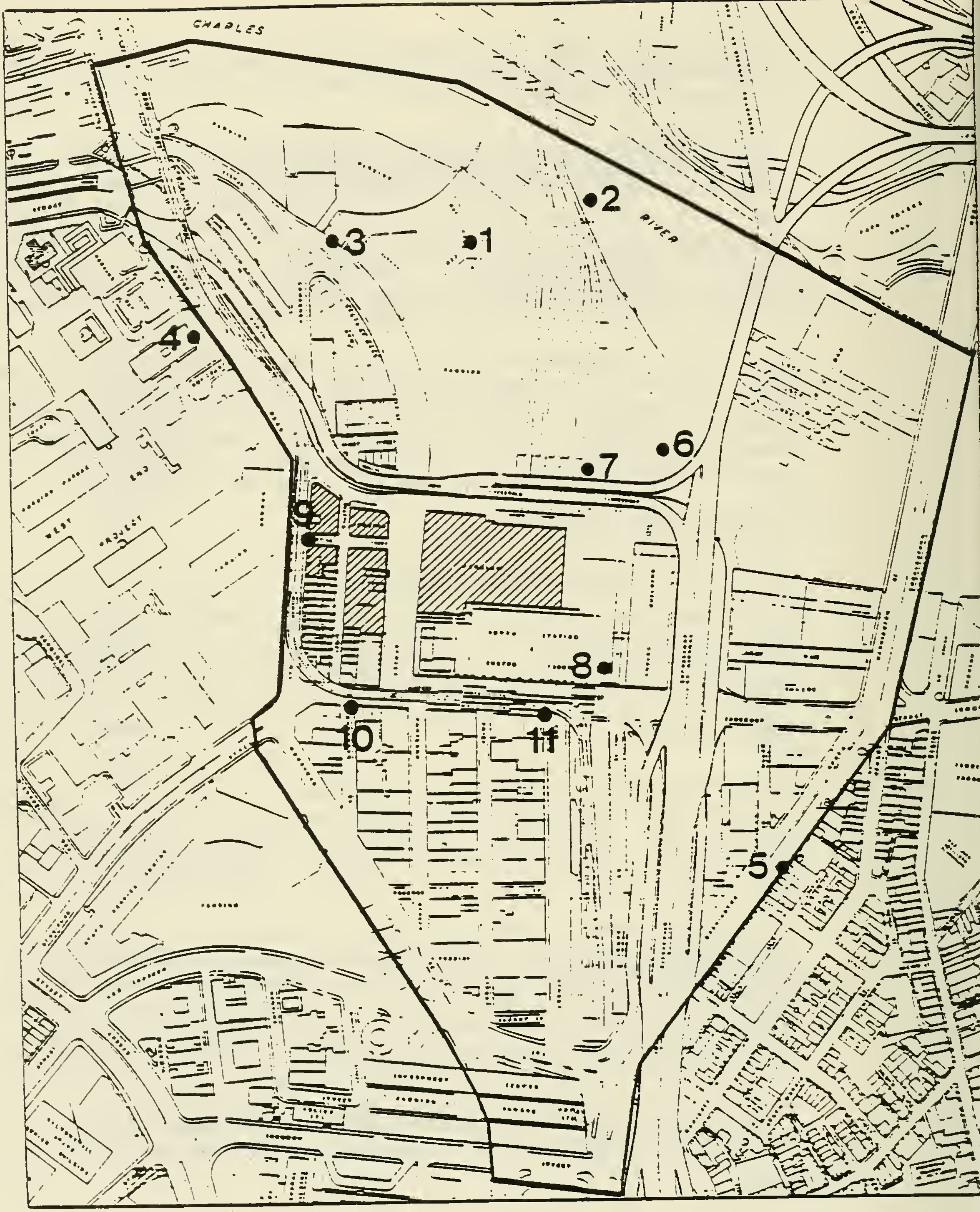

FIG. VI.I-2: NOISE SENSITIVE LOCATIONS FOR WHICH EXISTING AND FUTURE DAY-NIGHT SOUND LEVELS WERE COMPUTED.

TABLE VI.I-4

MODELLED PREDICTIONS OF NOISE LEVELS, IN dB L_{dn}, AT SELECTED RECEPTOR LOCATIONS AT NORTH STATION

Location*/	Noise Source	Day-Night Sound Level, dB L_{dn} by Alternative									
		No-Build				Preferred			Reduced Scale		
						2000 Green Ln. Alt.			2000 Green Ln. Alt.		
		1980	1987	2000	1987	1A	3	5C	1A	3	5C
1	Roads	72	72	73	73	68	68	68	72	72	72
	Rail	79	77	77	77	62	62	62	62	62	62
	Green Ln.	50	50	50	50	—†	—	—	47	50	50
	Total	80	78	78	78	69	69	69	72	72	72
2	Roads	—	—	—	—	72	72	72	72	72	72
	Rail	—	—	—	—	64	64	64	64	64	64
	Total	—	—	—	—	73	73	73	73	73	73
3	Roads	—	—	—	—	74	74	74	—	—	—
	Green Ln.	—	—	—	—	53	56	58	—	—	—
	Total	—	—	—	—	74	74	74	—	—	—
4	Roads	71	71	71	72	72	72	72	72	72	72
	Green Ln.	63	63	63	63	60	63	57	60	63	57
	Total	72	72	72	73	72	73	72	72	73	72
5	Roads	73	73	74	73	74	74	74	74	74	74
6	Roads	—	—	—	—	79	79	79	79	79	79
	Green Ln.	—	—	—	—	—	52	—	—	52	—
	Total	—	—	—	—	79	79	79	79	79	79
7	Roads	—	—	—	—	82	82	82	82	82	82
	Green Ln.	—	—	—	—	—	55	—	—	55	—
	Total	—	—	—	—	82	82	82	82	82	82
8	Roads	—	—	—	73	74	74	74	74	74	74
	Green Ln.	—	—	—	59	56	68	—	56	68	—
	Total	—	—	—	73	74	75	74	74	75	74

*For location see Fig. VI.I-2.

†"—" (dash) means that either the source contributes no significant noise in that alternative/year, or that the noise-sensitive location does not exist for that alternative/year.

Source: Bolt Beranek and Newman, Inc., Report No. 4477

Location 1. Proposed Housing (Preferred Alternative) / Massachusetts Rehabilitation Hospital (Reduced Scale Alternative)

Commuter rail operations dominate existing and no-build noise levels. If either build alternative is constructed, not only will much of the rail activity be undercover and hence its total noise reduced, but the new, large buildings would shield this location from some of the street/expressway traffic as well. For the Preferred Alternative in the year 2000, day-night sound levels are estimated to be about 69 dB rather than the existing 80 dB, while the Optional Alternative would have slightly higher levels of 72 dB. Construction of noise barriers along the west side of the expressway could reduce future levels even further.

Location 2. East End of Proposed Housing (Preferred Alternative) / Proposed Park East of Massachusetts Rehabilitation Hospital (Reduced Scale Alternative)

Day-night sound levels for the build alternatives are dominated by expressway traffic noise. They are estimated to be about 73 dB L_{dn}, regardless of alternative, and could be reduced by noise barriers constructed along the west side of the expressway.

Location 3. West End of Proposed Housing (Preferred Alternative) / Proposed Park (Reduced Scale Alternative)

Day-night sound levels in the year 2000 are estimated to be 74 dB. Expressway ramp traffic dominates the noise levels and could be reduced, though with some design/engineering difficulty, by construction of noise barriers along the northeast edge of the expressway on- and off-ramps.

Location 4. Charles River Park Housing, Facing Martha Road

All future build and no-build levels are within 1 dB of existing levels and are dominated by expressway ramp and Martha Road traffic noise. The Green Line contributes only slightly to total day-night sound levels; even if the Green Line were completely quieted (for example, routed underground), total levels would be reduced by only approximately 1 db. However, implementation of Green Line Alternative 3 (relocated elevated) would result in noticeable transit vehicle wheel squeal noise at this location due to the sharp radius curve in the alignment near this receptor. Use of noise barriers along the ramps is probably not practical because Martha Road traffic noise would still be present.

Location 5. Residences on North Washington Street Near Thatcher Street

Existing day-night sound levels are estimated to be approximately 73 dB. All future year, build and no-build levels, are 0 to 1 dB louder. North Washington Street and expressway traffic contribute about equally. Hence, noise barriers along the expressway would provide little reduction since North Washington Street traffic noise cannot be easily reduced.

Location 6. East End of Hotel (Preferred Alternative) / Housing Facing John Fitzgerald Expressway (Reduced Scale Alternative)

Expressway noise dominates the future day-night sound levels, which are estimated to be about 79 dB, regardless of which build alternative is selected. Such high levels at residential/hotel windows would mean that this site would be considered "unacceptable" for residential use according to HUD standards. Thus special care will be required to design adequate noise isolation into these buildings. Special window designs plus air conditioning/special ventilation will be necessary. Although Green Line noise levels are not expected to contribute significantly to the overall L_{dn} at this location, implementation of Alternative 3 would be expected to cause wheel squeal noise due to the sharp radius curve on the relocated elevated alignment.

Location 7. South Side of Hotel (Preferred Alternative) / Housing Facing Expressway Ramps (Reduced Scale Alternative)

As with Location 6, future day-night sound levels are expected to be very high - 82 dB - for both build alternatives and in the "unacceptable" category according to HUD standards. Noise control considerations must be incorporated into the building design if the buildings are to serve residential/hotel uses. Similar to Location 6 also, implementation of Green Line Alternative 3 would be expected to cause wheel squeal noise at Location 7 due to the sharp radius curve on the relocated elevated alignment.

Location 8. Optional Proposed Hotel at Existing Boston Garden Site

Future day-night sound levels are estimated to range between 73 and 75 dB at this location, dominated by road traffic on Causeway Street and the John Fitzgerald Expressway. Therefore, special care will be required to include adequate noise attenuation measures into the building design. Although Green Line noise is not expected to contribute significantly to the L_{dn} at this location, exposure to curve squeal noise would occur for 1987 and for the year 2000 Green Line Alternative 1A. Curve squeal would not occur for Green Line Alternative 3, but the relocated elevated structure for this option would pass within 30 feet of this hotel. Maximum train-passby noise levels for this case could be intrusive unless adequate noise isolation is designed into the building. (The same noise impact also would affect the adjacent Analex Building along Accolon Way.)

Locations 9, 10, 11. Sites Adjacent to Existing Green Line Elevated*

Existing and future day-night sound levels are estimated to range between 72 dB and 77 dB at these locations, the higher levels occurring in cases where the existing elevated alignment is retained (see Table VI.I-5). The Green Line contribution generally is significantly

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* Data for these locations were taken from the UMTA Green Line Alternatives Improvements Draft EIS.

TABLE VI.I-5

MODELLED PREDICTIONS OF NOISE LEVELS, IN dB L_{dn} AT SELECTED RECEPTORS ADJACENT TO EXISTING GREEN LINE ELEVATED

Location (1)		No-Build		2000 Build(3) Green Line Alt.		
Noise Source(2)		1980	2000(4)	1A	3	5C
9.	Roads	75	76	76	76	76
	Green Line	69	69	66	60	59
	TOTAL	75.6	76.8	76.4	76.1	76.1
	Transit L_{dn} Contribution	0.9	0.8	0.4	0.1	0.1
10.	Roads	72	73	73	73	73
	Green Line	68	64	66	58	54
	TOTAL	73.5	73.5	73.8	73.1	73.0
	Transit L_{dn} Contribution	1.5	0.5	0.8	0.3	0.1
11.	Roads	72	73	73	73	73
	Green Line	64	64	61	62	53
	TOTAL	72.6	73.5	73.3	73.3	73.0
	Transit L_{dn} Contribution	0.6	0.5	0.3	0.3	0.0

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(1) For location, see Fig. VI.I-2.
(2) Contribution of commuter rail is not significant at these receptors.
(3) There is no signficiant difference between the Preferred and Reduced Scale alternative at these receptor locations.
(4) The slightly higher noise levels for the Green Line in 2000 reflect additions to daily train trips to accommodate projected increased ridership.

Source: U.S. Department of Transportation, Urban Mass Transportation Administration, Boston Green Line Improvements at North Station Draft Environmental Impact Statement, August 1982, Table 6, 18.

reduced under the two relocation alternatives. Although these calculated levels would fall into the "normally unacceptable" or "unacceptable" categories of HUD standards, no residentially-related uses currently are projected for any of these locations.

Green Line Relocation

Of particular importance to the future noise environment of the North Station project area is the relocation of the existing Green Line elevated, which can affect ambient noise levels in several ways. First, the relocation proposals may produce positive impacts by reducing or altering transit noise impacts or by removing existing noise sources in the area. The demolition of the Causeway Street/ Lomasney Way elevated structure would remove a reflective concentration of traffic noise along these streets. The relocation of the elevated structure to follow the alignment of the Storrow Drive/ Central Artery ramps would place this structure in a corridor of high ambient noise levels presently caused by the heavily-used roadways. Even if the elevated were not enclosed in adjacent buildings (as presently proposed), the Green Line transit noise and the reflective vehicular noise which would be associated with the new structure would have no significant impact due to the existing high ambient levels. (In no case would the Green Line contribute more than 1.5 dB(A) to the background, a noise level change that would be imperceptible to most humans.) Relocation of a portion of the Green Line in a subway enclosure would, of course, remove any external noise source from that part of the alignment.

Secondly, the relocation may increase the generation of wayside noise, either of the impact (including roar) or the squeal type. Actual squeal impact would depend on the radii of curves, the nature of noise abatement measures adopted, and the type of construction of the elevated structure. For the elevated option, squeal impact potential would result from the curve of approximately 150-foot radius north of the Analex Building. Squeal impact potential for the subway option would exist where the transition ramps would make several curves as it approaches the connection with the elevated near Science Park Station. Current squeal and roar impacts and the "roof effect" from the existing elevated structure would continue with the no-build alternative, but would be reduced somewhat - but not entirely eliminated - by the structure's reduced width, the provision of noise attenuation techniques such as continuously welded rail and resilient track fasteners, and new ties and a floating slab track bed under the refurbished base case (upgrading) option. Squeal and roof effect - the dominant existing Green Line noise impacts - would continue to affect sensitive receptors along Causeway Street due to the retention of the overhead structure with its tight curves at Canal Street and Lomasney Way.

Another impact would be in-car impacts, which would occur where a tight curve had the potential of producing squeal in an underground alignment. For the subway alternative, such impacts potentially would exist where cars would have to negotiate a tight radius curve just east of the North Station platform. Actual impacts would depend on the final radius of curvature of the rails, the soundproofing of the car body, and the use of squeal-abatement measures.

Several mitigation measures, including modifications to alignments, the addition of noise barriers, retrofiting of wheels with noise-attenuating devices, construction techniques, and operational strategies, are available to abate transit noise. These measures are listed on Table VI.I-6.

Building Mechanical Systems

In addition to the traffic-generated noise described above, building mechanical systems, located in and on buildings, can and do introduce noises that will impact the surrounding environment. Unlike some traffic noise sources, these systems radiate noise in the same place, at a relatively continuous level. Such potential noise sources could include intake and exhaust louvres, discharge stacks, air conditioners, cooling towers, and similar equipment. In several of these, the actual noise generated is somewhat removed from the "noise location", such as a fan placed behind a louvre. Typical sound level ranges and exposure for various types of building equipment systems are indicated in Figure VI.I-3.

Since detailed building designs are not available, the actual extent of noise impact from building equipment cannot be estimated at the present time. The extent of the environmental noise at any receptor location would be a function of the HVAC system capacity, acoustical design aspects, location, and ambient conditions. However, it is expected that the design of such systems will meet or exceed applicable noise level criteria and that noise levels will be as low as current available technology allows for the benefit of future residents and the community. Building equipment noise can be regulated by both design and mechanical controls to ensure that levels do not adversely affect ambient conditions. Where possible, the location of the equipment at the highest point of the project can serve to reduce the noise impact by normal decay with distance of sound pressure levels, molecular absorption, and the simple geometric spreading of the energy from a point-like source.

2.3 Storrow Drive Connector Relocation/Central Artery Depression Impacts

Any future implementation of the Storrow Drive Connector relocation proposals also would affect project area accoustic noise levels (the BBN analysis assumed a continuation of the existing ramp system). With any of the bridge options, there would be some increase in perceived noise levels at the bridge approaches due to the laboring of truck engines and to the downshifting of gears. However, perceived noise at ground level from vehicles on the bridge would be less than from the same traffic on surface streets (the main exception being the Massachusetts Rehabilitation Hospital, were it retained, particularly with DPW Alternatives 3 and 4, where the elevated bridge sections would pass very near the present hospital

TABLE VI.I-6

MEASURES TO MITIGATE TRANSIT NOISE

	Wayside				
Structure or Method	Impact	Squeal	Vibration	In-Car*	In-Station
Construction Options:					
Elevated	-	-		+	
Subway	++	++	++	-	-
No Tight Curves		++		+	+
Tie & Ballast on Concrete	+		+		
Welded Rails	++		+	+	+
Resilient Bed Mats	+		+		
Resilient Rail Fasteners	+	+	+		+
Wayside Noise Barriers	+	+			
Hardfacing Rails		++		+	
Car Options:					
Steerable Trucks		++		+	
LRV-Modern Car Design	+	+	+	+	+
Frame Sound-Proofing				++	
Resilient Wheels	+	++	+	+	+
Ring-Dampers		++		+	
Quieter Auxiliary Eqpt.				++	++
Operations:					
Lower Speeds	+		+	+	
Grind & True Rails & Wheels	+	+	+	+	+
Wheel Flange Lubrication		++		+	

Note: Effectiveness is rated from "--" (large negative effect) to "++" (large beneficial effect). Blank space means insignificant effect.

*Actual effectiveness of each control measure depends on the exact cause of the in-car noise.

Source: U.S. Department of Transportation, Urban Mass Transportation Administration, Draft Environmental Impact Statement - Boston Green Line Improvements at North Station, August 1982, Table 19.

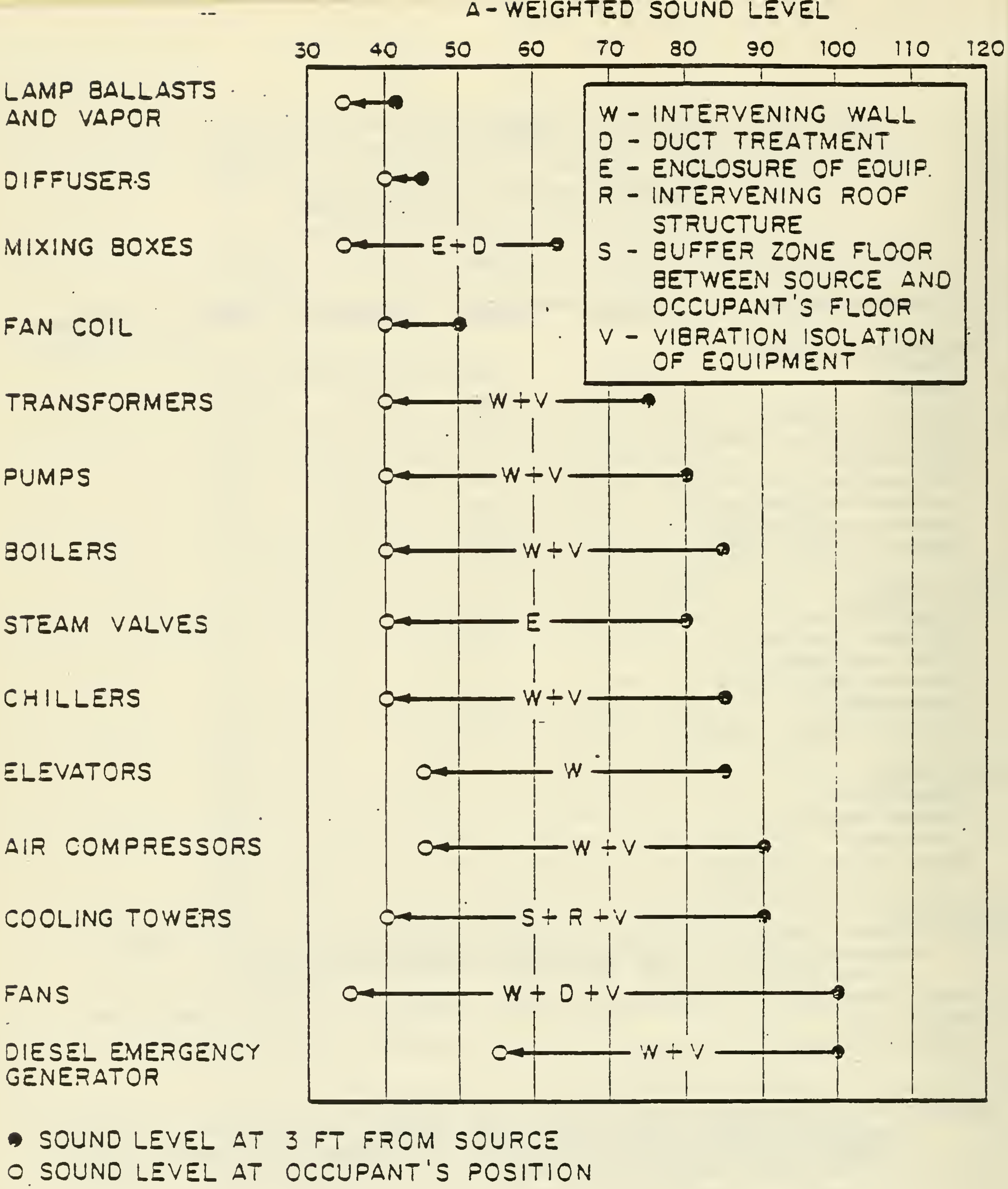

Figure VI.I-3: RANGE OF BUILDING EQUIPMENT NOISE LEVELS TO WHICH PEOPLE ARE EXPOSED[1]

building - see Figure VI.C-12). On the whole, the general impact might be perceived as a slight decrease. Perceived noise levels would be reduced to a greater extent with adoption of the tunnel option. Although noise levels within the tunnels themselves would be high, they would be largely contained within the tunnel sections. However, new noise sources would be added to the area by the requirement for ventilation and exhaust fans.

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[1] U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances (NTID 300.1), Dec. 31, 1971

The Central Artery depression proposals in the North Station area would have very similar impacts as well, particularly with respect to the tunnels connecting the depressed Artery to Leverett Circle/ Storrow Drive. The lower level of the Charles River bridges, however, would result in higher perceived noise levels on the ground level in the vicinity of the bridges than are currently found. According to the Third Harbor Tunnel/Central Artery Supplemental DEIS/EIR, future noise levels at the Charles River Dam Park (at the Charlestown end) with implementation of the project were estimated at L_{eq} 77 dB(A), 8 dB higher than existing levels and 10 dB higher than FHWA Noise Abatement Criterion. Construction of a 10-15 foot barrier along the elevated roadway could reduce future levels by 8 dB but they still would exceed the acceptability standard.

2.4 Vibration Impact

Heavy vehicles on elevated structures and trains moving on rough or jointed rails may produce ground vibrations that are transmitted into nearby buildings where they can be strong enough to be felt. Such vibrations have the potential to cause minor architectural damage, such as fine plaster cracks, or, if occurring at extremely high levels, to cause serious structural damage, glass breakage, and falling plaster. In addition, human beings can experience the effects of prolonged vibration (the lower bound of perceptible vibration is usually given at approximately 0.0035 in/sec (rms), leading to problems of annoyance and distraction. Although there are no hard data identifying traffic-induced vibration levels that may trigger minor building damage, research has determined that the threshold of architectural damage to buildings occur at peak particle velocity of 0.2 in/sec.* Comparing this criteria to the perception threshold curve for humans developed by T. Miwa (Figure VI.I-4), it is clear that vibration levels which are not perceptible to humans are very unlikely to produce any structural damage.(3)

With the relocation of the Green Line elevated, the elevated expressway and ramps, and the commuter rail tracks beneath the proposed project development, many opportunities would exist for long-term vibration-related problems. Site preparation and construction

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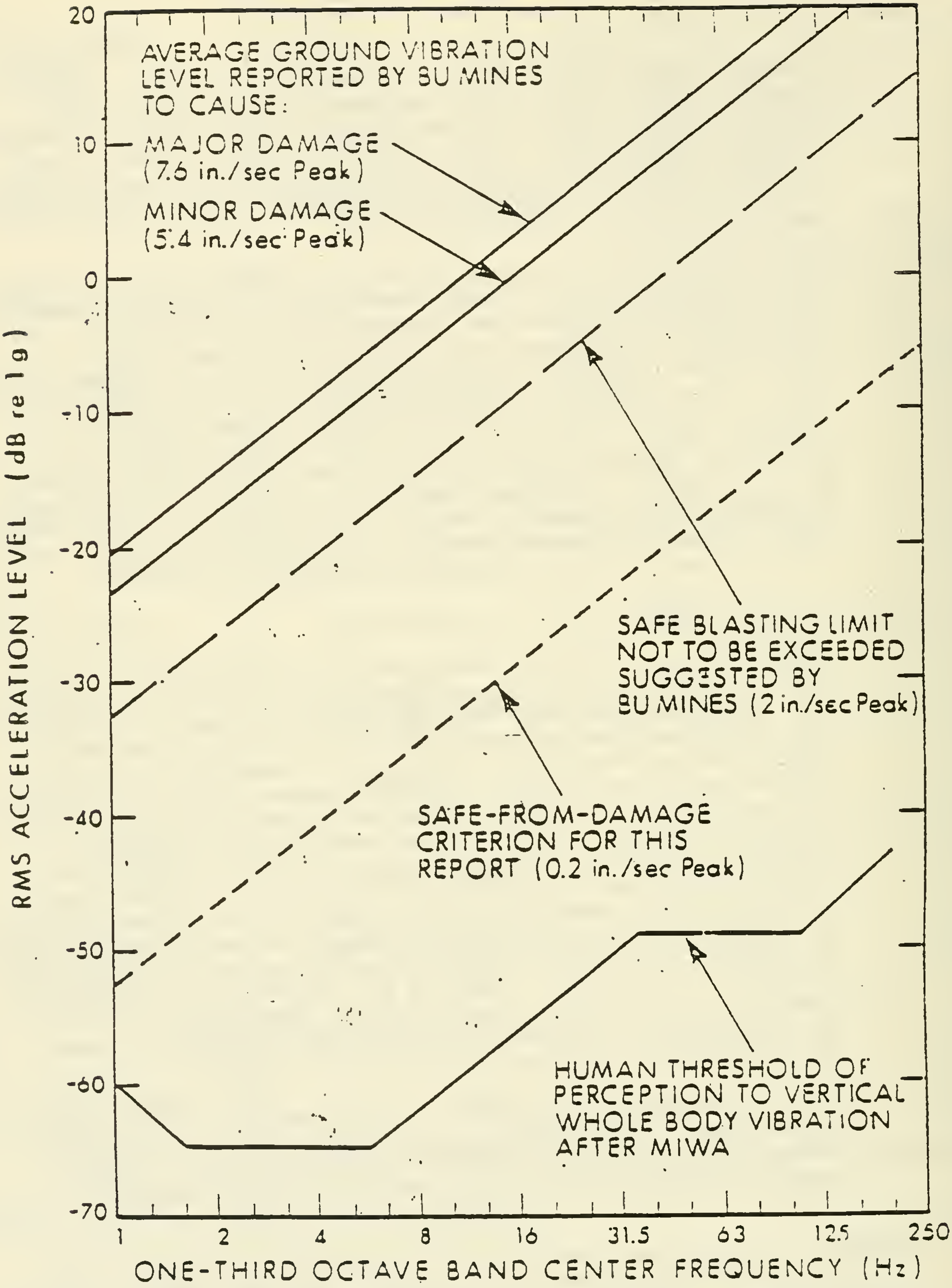
* However, vibration levels measured at the Massachusetts Rehabilitation Hospital for the Third Harbor Tunnel/Central Artery Supplemental DEIS/EIR indicated peak ground velocity due to commuter train movements of 0.47 in/sec. on the track closest to the measurement position (15 feet away), with no architectural damage apparent.



Source: Bolt Beranek and Newman, Inc., Three-A Interstate System for Baltimore City: Assessment of Traffic-Induced Ground Vibration, (Clive Dym and Timothy Gutowski), July 1975, Appendix D-2.

Figure VI.I-4: VIBRATION DAMAGE CRITERIA

activities, particularly pile driving, also would result in vibration impacts, although these generally would be intermittent (see also Part VI.E.2 supra). Detailed analysis of these potential problems will be undertaken as the Phase II development is further defined and prior to actual construction.

J. Energy

1. Energy Requirements and Impacts

Energy requirements for the North Station project will be created by the various proposed residential, retail/commercial, office, hotel, and institutional uses.

All new buildings will be constructed in accordance with the State Building Code provisions for energy conservation, Article 20 of the 3rd edition of Massachusetts State Building Code. The scope of these Code provisions sets forth requirements for buildings covering their exterior envelopes and selection of their HVAC, service water heating, electrical distribution, and illuminating systems and equipment for effective use of energy.

At the present time, the energy needs for the total project development can only be grossly estimated, based on available data and reasonable assumptions. However, since the project will be phased over the next 15-20 years, it would be impossible at this early stage to identify the mix of energy sources that would be used. Ideally, over the next several years, advances will be made in the practical use of renewable energy sources, such as solar power, and alternative energy techniques (co-generation, heat recycling), so that these features could be incorporated, if appropriate, into the new residential and commercial buildings.

A major consideration in the design of the specific structures for the North Station project will be the total energy requirements and their effect on air quality during the operational phase of the development. Energy demand, mode of delivery, and fuel types directly influence the level of consumption of non-renewable fuels and the air pollution emissions, both on-site and off-site. Several other factors enter into selection of an energy system, including capital and operating costs and fuel availability and cost. However, particularly in an urban area where there already exist violations of ambient air quality standards, conservation of fossil fuels and minimization of pollutant emissions should be a prime consideration.

In order to evaluate the future energy and related air quality impacts of the North Station project and to provide useful data for making energy decisions, an analysis of fuel usage and emissions from several energy scenarios for the project was conducted. The analysis did not model the additive impact that emissions would have on ambient air quality levels. Rather, it predicted total usage of various fuels and total emissions in order that the different energy scenarios could be evaluated by comparison.

The North Station project is to be developed in two phases, which should be completed by the year 2000. Therefore, in the analysis, the energy demands from each phase of the development were combined to predict total fuel usage and air pollutant emissions from the project for 2000. Table VI.J-1 summarizes the total square footage

Table VI.J-1

North Station Project: Building Areas and Annual Energy Demand

	Development Options		
Building Type	North Station-1 Area (Sq. Ft.)	North Station-2 Area (Sq. Ft.)	Energy Demand (BTU/Sq. Ft./ Year)*
GSA	800,000	800,000	33,000
Private Office	400,000	890,000	151,000
Residential	1,300,000	350,000	139,000
Retail/Commercial	215,000	150,000	191,000
Arena	350,000	350,000	189,000
Parking	1,295,000	1,015,000	30,000
Hotel	225,000	-	225,000
Hospital	-	154,000	460,000
Museum	115,000	-	200,000

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*Source: Based on building energy requirements developed under BRA's Site and Neighborhood Design (SAND) Program, funded by the Office of Building and Community Systems, U.S. Department of Energy, Contract No.: 31-109-Eng.-38.

for each building type for both the Preferred development program (North Station 1) and the Optional development program (North Station 2). Each building type generates a different energy demand in terms of BTU's per square foot per year and, therefore, average annual BTU's per square foot per building type, at the building wall, were assumed and factored into the program (Table VI.J-2). Total BTU/yr. requirement at the building wall for the North Station project is estimated at 5.007×10^{11} for the Preferred program and 4.1308×10^{11} for the Optional program. However, the BTU requirement at the energy source to meet the demand at the wall would vary depending on the particular energy system and its efficiency.

For each building type, there are up to six end-uses: heating, hot water, cooling, cooking, lighting/elevator/appliances, and HVAC system. Ten energy scenarios were developed around potential heat/hot water systems for the project buildings in the year 2000. These scenarios include:

1. all electric
2. natural gas
3. oil heat
4. district steam heating
5. district steam heating and cooling
6. cogeneration/gas-fired
7. cogeneration/diesel-fired
8. district hot water
9. solar/heat pumps
10. a probable scenario or likely combination of energy systems for the project.

The remaining end-uses were assumed to be met by different appropriate energy systems, with emphasis on natural gas for cooking electricity for cooling, lighting, and HVAC. In Table VI.J-3, the ten energy scenarios and end-use systems applied to each building type are outlined.

There are eight major energy systems for the different energy scenarios. The efficiency rates and fuel mix assumptions for each energy source are summarized in Table VI.J-4. The efficiency of an energy system is defined as the ratio of BTU's required at the building wall to the BTU input required at the energy source to meet the wall demand. For example, a 33% efficiency for electricity indicates that for every BTU required at the wall of a particular building, approximately 3 BTU's of energy must be generated at the source, with transmission losses accounting for the difference. With respect to fuel mix, electricity assumes off-site generation by Boston Edison with a mix of fuels including coal, oil, natural gas, and uranium. Natural gas would be supplied conventionally by Boston Gas Company and burned on-site. Oil heat assumes on-site oil boilers using #6 oil with 1% sulphur content. District steam assumes off-site generation of steam by trash or oil-fired boilers to provide space heating and hot water. Cogeneration involves the simultaneous production of heat and electricity on-site and can use

Table VI.J-2

Energy System BTU Requirements at Source

Energy Scenario	Development Options North Station-1* (BTU's x 10^{12})	 North Station-2** (BTU's x 10^{12})
All Electric	1.5886	1.3069
Gas Heat	1.2169	1.0551
Oil Heat Boilers	1.1422	1.0715
District Steam-1	1.2643	1.0882
Gas Cogeneration	7.8185	6.5587
Diesel Cogeneration	5.9077	4.8695
District Steam-2 (with cooling)	1.2235	1.0367
District Hot Water	1.1967	1.0409
Solar/Heat Pumps	1.0150	0.8920
Probable Scenario	1.3068	1.1515

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* North Station-1 requires 5.007×10^{11} BTU's at building wall.

** North Station-2 requires 4.1308×10^{11} BTU's at building wall.

Source: Based on BTU requirements at building wall and efficiency rates of contributing energy systems.

Table VI.J-3

North Station Project: Energy Systems and End-Use Scenarios

Major Energy System	End-Use					
	Heating	Hot Water	Cooking	Cooling	Lighting**	HV
All Electric	elec	elec	gas/elec*	elec	elec	elec
Natural Gas Heat	gas	gas	gas	elec	elec	elec
Oil Heat Boilers	oil	oil	gas	elec	elec	elec
District Steam 1	dist steam	dist steam	gas	elec	elec	elec
Gas Cogeneration	cogen	cogen	gas	cogen	cogen	coge
Diesel Cogeneration	cogen	cogen	gas	cogen	cogen	coge
District Steam 2 (with cooling)	dist steam	dist steam	gas	dist steam	elec	elec
District Hot Water	dist h/w	dist h/w	gas	elec	elec	elec
Solar/Heat Pumps	solar/ ht pump	solar/ ht pump	gas/elec*	ht pump	elec	elec
Probable Scenario						
- GSA	dist h/w	elec	gas	solar	elec	elec
- Private Office	elec	elec	elec	elec	elec	elec
- Retail/Commercial	elec	elec	elec	elec	elec	elec
- Residential	gas	gas	gas	elec	elec	elec
- Arena	gas	gas	-	elec	elec	elec
- Parking	elec	elec	-	-	elec	elec
- Hotel	elec	elec	gas	elec	elec	elec
- Hospital	gas	gas	gas	elec	elec	elec
- Museum	s/hp	s/hp	-	ht pumps	elec	elec

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* Gas cooking for hotel in North Station-1 and hospital in North Station-2, electricity for all other cooking in "all electric" and "solar/heat pumps" scenarios.

** Includes elevators, appliances, and business machines.

Table VI.J-4

Efficiency Rates and Projected Fuel Mix of Major Energy Sources: Year 2000

	Efficiency* Rate	% Coal	% Oil	% Nat. Gas	% Diesel	% Trash	% Uranium	% Solar
Electricity**	33	60	5	5	-	-	30	-
Gas	78	-	-	100	-	-	-	-
Oil Heat (on-site boilers)	70	-	100	-	-	-	-	-
District Steam 1 & 2	65	-	50	-	-	50	-	-
Cogeneration-Gas	76	-	-	100	-	-	-	-
Cogeneration-Diesel	85	-	-	-	100	-	-	-
District Hot Water	85	-	50	-	-	50	-	-
Solar/Heat Pumps***								
Solar	250	-	-	-	-	-	-	100
Heat Pump	91	60	5	5	-	-	30	-

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* Source: Massachusetts Energy Office

** Source of fuel-mix percentages is Boston Edison Company estimates.

*** Solar/Heat Pumps is a dual system. Solar energy is used for 40% of heat and 80% of hot water; electric heat pumps are used for the remaining 60% of heat and 20% of hot water.

either diesel or natural gas fuel. Solar/heat pumps assume a combined system using solar energy for 40% of heat and 80% of hot water and electrically-generated heat pumps for 60% of heat and 20% of hot water.

In addition, it should be noted that both the district steam and the gas cogeneration systems also have backup systems. For district steam, electricity from Boston Edison would supply 10% of the power needed; and for gas cogeneration, 10% backup would be provided by Boston Edison and district steam. No off-site backup would be required for diesel cogeneration.

The ten energy scenarious evaluated can be compared in terms of volume of fuels consumed annually, on-site air pollutant emissions, off-site air pollutant emissions, and total air pollutant emissions (Tables VI.J-5 and VI.J-6). For example, a cogeneration system using natural gas fuel conserves significant quantities of fossil fuel and produces the least total emissions for all pollutants. A diesel fuel cogeneration system also would consume a relatively low volume of fossil fuel and significantly lower total emission levels of NO_2, SO_2, and TSP than non-cogeneration scenarios. Although no off-site emissions would be emitted through diesel cogeneration, on-site emissions would be higher than for any other scenario. Solar/heat pumps would produce only slight on-site emissions from gas cooking for the hotel or hospital, but would generate off-site and total pollutant emissions higher than for some pollutants in other scenarios. This higher off-site emission rate is due to the fact that the heat pumps are generated by electricity, which has only a 33% efficiency rate. Natural gas provided by a central utility for all end-uses would generate off-site and total emissions that approximate solar/ heat pump emissions, but would also emit on-site pollutants.

The energy systems combined to generate the "probable scenario" were not selected on the basis of desirability of emission levels but rather on several assumptions regarding probable energy-source trends in current and near-future development. The major assumption was that current practices would continue for at least the next 20 years. These practices include a continued emphasis on electricity but with a slow shift toward the use of natural gas. (However, significant price increases anticipated from the deregulation of natural gas and the current policy of Boston Gas not to guarantee a future rate could reverse this trend.) It also has been assumed that Boston Edison Company would not be expanding its base for the next several years, particularly in view of the recent decision not to proceed with the construction of the Pilgrim II nuclear power plant. Another practice in current development is the emphasis on first, or capital, costs rather than life-cycle costs. Finally, there presently is no significant government support of innovative energy technology in private development, a fact which makes the continued use of more traditional energy sources and techniques a more probable assumption.

Table VI.J-5

NORTH STATION-1: FUEL CONSUMPTION AND EMISSIONS

		All Electric	Natural Gas	Oil Heat	District Steam	Cogeneration (Gas)	Cogeneration (Diesel)	District Steam (Cooling)	Dist. Hot Water	Solar/ Heat Pumps	Probable Scenario
Fuel Consumption	Coal (Tons)	27,324	16,630	13,977	16,402	1,329	0.00	16,517	16,401	18,818	21,383
	Oil (Barrels)	13,612	8,273	51,695	20,397	2,064	0.00	22,005	17,493	8,679	9,783
	Gas (mm. cu.ft.)	84.9	303.06	58.60	138.97	689.3	20.38	136.76	122.09	56.29	226.17
	Diesel (m. gal.)	0.00	0.00	0.00	0.00	0.00	4,103.5	0.00	0.00	0.00	0.00
	Trash (Tons)	0.00	0.00	0.00	14,098	16,927	0.00	168,005	10,721	0.00	0.00
	Uranium (Grams)	8,104	4,925	4,128	4,925	361.89	0.00	4,499	4,925	5,167	5,824
On-Site Emissions Ton/Year	CO	0.06	2.51	4.89	0.20	5.78	31.80	0.09	0.20	0.06	1.67
	NO_2	0.23	10.05	28.10	0.80	56.74	139.92	0.35	0.80	0.23	6.67
	SO_2	0.00	0.08	48.86	0.01	0.20	62.75	0.00	0.01	0.00	0.05
	HC	0.02	0.99	1.00	0.08	1.06	11.52	0.03	0.08	0.02	0.66
	TSP	0.03	1.25	3.59	0.10	3.38	10.36	0.04	0.10	0.03	0.83
Off-Site Emissions Tons/Year	CO	18.48	11.23	9.41	23.81	2.34	0.00	25.25	20.18	11.78	13.28
	NO_2	340.75	207.09	173.59	246.25	19.92	0.00	235.83	236.87	217.25	244.89
	SO_2	517.97	314.80	263.87	334.03	25.44	0.00	310.47	329.42	330.25	372.26
	HC	5.26	3.20	2.68	3.48	0.27	0.00	3.26	3.41	3.36	3.78
	TSP	43.49	26.43	22.15	28.40	2.18	0.00	26.49	27.93	27.73	31.25
Total Emissions Tons/Year	CO	18.54	13.74	14.31	24.01	8.12	31.80	25.34	21.00	11.84	14.95
	NO_2	340.98	217.14	201.69	247.05	76.66	139.92	236.18	237.67	217.48	251.56
	SO_2	517.97	314.87	312.73	334.03	25.64	62.75	310.47	329.43	330.25	372.31
	HC	5.29	4.19	3.68	3.56	1.33	11.52	3.29	3.49	3.38	4.41
	TSP	43.52	27.68	25.75	28.50	5.56	10.36	26.54	28.03	27.76	32.08

Table VI.J-6

NORTH STATION-2: FUEL CONSUMPTION AND EMISSIONS

		All Electric	Natural Gas	Oil Heat	District Steam	Cogeneration (Gas)	Cogeneration (Diesel)	District Steam (Cooling)	Dist. Hot Water	Solar/ Heat Pumps	Probable Scenario
Fuel Consumption	Coal (Tons)	23,078	15,668	15,498	14,989	1,465	0.00	14,652	14,984	16,392	19,775
	Oil (Barrels)	11,177	7,560	38,888	16,046	1,725	0.00	17,255	14,013	7,609	9,048
	Gas (mm. cu.ft.)	72.24	219.97	54.32	105.12	563.42	11.83	112.15	93.31	51.49	152.12
	Diesel (m. gal.)	0.00	0.00	0.00	0.00	0.00	3,418	0.00	0.00	0.00	0.00
	Trash (Tons)	0.00	0.00	0.00	9,867	12,269	0.00	122,685	7,504	0.00	0.00
	Uranium (Grams)	6,654	4,501	4,501	4,501	399	0.00	3,991	4,501	4,530	5,386
On-Site Emissions Tons/Year	CO	0.07	1.73	3.35	0.12	4.72	26.44	0.12	0.12	0.07	0.98
	NO_2	0.29	6.93	24.78	0.47	46.50	116.35	0.47	0.47	0.29	3.92
	SO_2	0.00	0.05	38.15	0.00	0.17	52.27	0.00	0.00	0.00	0.03
	HC	0.03	0.69	0.68	0.05	0.86	9.57	0.05	0.05	0.03	0.03
	TSP	0.04	0.86	3.10	0.06	2.77	8.60	0.06	0.06	0.04	0.49
Off-Site Emissions Tons/Year	CO	15.17	10.26	10.26	19.07	2.01	0.00	20.05	16.96	10.33	12.28
	NO_2	279.79	189.25	189.25	216.65	20.19	0.00	201.88	210.09	190.46	226.48
	SO_2	425.31	287.67	287.67	301.13	27.18	0.00	271.82	297.91	289.52	344.27
	HC	4.32	2.92	2.92	3.12	0.28	0.00	2.84	3.07	2.94	3.50
	TSP	35.71	24.15	24.15	25.53	2.31	0.00	23.13	25.20	24.31	28.91
Total Emissions Tons/Year	CO	15.25	12.00	13.61	19.19	6.72	26.44	20.17	17.08	10.40	13.26
	NO_2	280.07	196.18	214.03	217.12	66.69	116.35	202.35	210.55	190.75	230.40
	SO_2	425.31	287.73	325.82	301.14	27.35	52.27	271.82	297.91	289.53	344.30
	HC	4.35	3.61	3.61	3.17	1.14	9.27	2.88	3.12	2.97	3.89
	TSP	35.74	25.02	27.25	25.59	5.08	8.60	23.19	25.26	24.34	29.39

In evaluating an energy system or combination of systems for the project site, a scenario cannot be selected solely in terms of least fuel consumption and/or least total air pollutant emissions. Ambient air quality concentrations of individual pollutants and the impact of a particular scenario on each pollutant need to be evaluated or modelled in terms of allowable safe pollutant concentrations. For example, while a cogeneration system may be desirable in terms of low energy consumption and efficiency, the site may not be able to accommodate higher NO_2 levels and trade-offs would have to be made. As indicated previously, capital costs, fuel costs and availability, and physical constraints of the site are parameters that must be factored into selection of any energy scenario for the site. Environmental and economic variables related to energy decisions should be evaluated during the preliminary design stages of the development in order that these energy features can be an integral part of the development and design decisions.

The hotel option for the Phase I North Station site development parcel would require an estimated 15.4×10^9 BTU/yr. less energy than the office building option, which would result in a slightly lesser amount, annually, in fuel consumption and pollutant emissions. Compared to the overall project requirements and impacts, however, these differences would not be significant (3% to 4% for the preferred and optional development programs respectively).

Under the no-build alternative, energy sources and consumption would be expected to remain virtually the same as currently exist, with little or no improvements in the project area energy systems.

2. Conservation Potential

With the recent concern for energy conservation, the potential advantage of rehabilitation and adaptive reuse over new construction has been receiving increasing attention. New construction is a significant user of energy resources. Considerable quantities of energy are required for the production of structural steel, brick, concrete, precast and aluminum panels, and other materials required for a new building. According to an Energy Research and Development Agency (ERDA) study,(1) rehabilitation consumes 23% less energy than new construction; in 1967, the base year studied, it took 49,000 BTU's per square foot to rehabilitate a structure compared to 65,200 BTU's per square foot to build it new. In addition, fewer natural resources are utilized in the reuse of an existing structure. Finally, rehabilitation has significant economic benefits. Rehabilitation costs per square foot generally run 25%-33% less than comparable new construction. Demolition costs inside buildings being recycled are minimal, usually only 1%-4% of the total project costs, and structural costs are also low, normally varying from about 5%-12% of the total. In general, in projects where a maximum effort is made to reuse the existing interior and exterior materials, the costs are substantially below those for new construction.(2)

Since the preferred development program proposes the complete clearance and redevelopment of the project area, there would be no potential for the conservation and reuse of the existing buildings and hence for the significant benefits that could result (however, there would exist a limited potential for the reuse or recyclying of existing building materials salvaged from the demolition). The reduced-scale development program, on the other hand, does propose the retention of the Registry/DPW Building and the Massachusetts Rehabilitation Hospital, although all other buildings would be cleared. There also would be significantly less new construction in the Phase II sub-area. Thus there would be a greater potential for energy and resource conservation with the optional program, although on an overall project per square foot basis the advantage would be reduced considerably, because of the lesser development proposed.

Using the ERDA figures cited above, the 4,700,000 sq.ft. of new construction proposed in the preferred program would require 3.064×10^{11} BTU's of energy, whereas the 3,350,000 sq.ft. of new construction and 240,000 sq.ft. of rehabilitated space (no rehabilitation is assumed to be necessary for the Rehabilitation Hospital) would consume 2.302×10^{11} BTU's of energy. However, where the preferred program, being all new construction, would require 65,200 BTU's per square foot, the reduced-scale program, on the average, would require nearly an equal amount of energy - 64,125 BTU's per square foot. Therefore, the conservation potential of the reduced-scale program is really related only to the lesser amount of new construction proposed and not to the retention of certain existing buildings. (There would be, of course, other energy costs associated with building demolition and site preparation for new construction, which would favor the optional development program.)

The no-build option would offer the maximum opportunity for resource reuse and conservation potential. However, the realization of these advantages would be highly unlikely, given the existing building conditions, except for the Registry Building and the Hospital. Of the other major structures in the project area, both the Madison Hotel and the Boston Garden have been examined in the past for possible rehabilitation. The Boston Housing Authority studied the potential for converting the Madison Hotel into elderly housing but determined that such would be economically infeasible because of its small rooms and layout. The Arena Committee investigated, as one option, the total renovation of the Boston Garden but found that the structural changes and other improvements that would be necessary to convert the present Garden into an acceptable sports arena would cost nearly the same as the construction of a new facility. Under these conditions, the no-build alternative would offer few advantages over the current development proposals.

K. Urban Quality

1. Urban Quality and Character

As noted previously, the North Station project site today is dominated by transportation-related land uses - over 70% of the land area is devoted to streets and highways, surface parking lots, and railroad tracks. Most of the existing structures, which are concentrated in Sub-area I, are suffering from lack of maintenance and physical deterioration. The 16-story Madison Hotel has been vacant for several years and the Billerica Street blocks, the last remnant of the old West End, are a mixture of small parking lots scattered among deteriorating three- and four-story structures. The Charles River, its perception nearly nonexisting, is virtually inaccessible to pedestrians. Finally, the presence of the Green Line elevated structure is perceived as a significant deterent to the upgrading of adjacent properties. As a result, the overall image of this underutilized area is generally seen to be unattractive and an adverse influence on any rejuvenation of this section of Boston's downtown.

Redevelopment of this area with the concentrated development as proposed should result in a significant improvement in its urban and aesthetic character, by replacing the unsightly vast open parking areas and rail yard and substandard buildings with a defined urban fabric combined with attractive parkland and pedestrian amenities.

In developing the site plan and, in particular, its major design feature - the new canal and mid-river island - Moshe Safdie and Associates, the design and planning consultants to the Authority, studied four land-structuring scenarios whose main emphasis was on redefining the river's edge (see Appendix P). The basic design theme was the concept that the Charles River, as it passed the North Station area, should combine the qualities of promenade, linear green space, building edges, and residential and small commercial activity. Briefly, the four scenarios may be described as follows:

1) Land extension - This scenario assumed little manipulation of the river's edge but relied upon open spaces and pedestrian parks to connect developed areas.

2) Piers and canals - In this scenario, the water was brought into the site as a series of channels and bridges that intersected the area, allowing walkways, buildings, and open spaces to share a common water experience.

3) Island - This scheme added a new island and channel of water to the Charles, the island being large enough to permit development, open space, and public spaces to coexist on both sides of the channel.

4) Urban basin - This approach redefined the Charles as a grand basin, bound on either side with urban activity, linear park spaces, and development back from the edges.

With these scenarios in mind, Safdie Associates then explored a series of alternative design strategies, each of which implied different approaches towards land use, including location, quantities, massing, and circulation. These development strategies were designed to emphasize relationships of land uses and movement rather than define specific walkways and roads. The five alternative strategies considered are outlined below and are described in further detail in Appendix P.

1) Back Bay fabric - In this scheme a residential neighborhood similar in scale and form to the Back Bay would be developed between the river's edge and the Storrow Drive Connector ramps, and office development would be concentrated on the Boston Garden sub-area (the neighboring Bulfinch Triangle area would continue as a commercial/wholesale district).

2) Towers in the park - The river area would be developed as an extension of the Charles River Park development pattern, with residential towers located along Lomasney Way. Near the new dam, hotel and commercial uses would be developed, and the Garden sub-area would become a major retail center.

3) Piers and canals - Water canals would be used to define land uses and development parcels. Housing activity would be located adjacent to Charles River Park, with a hotel/office/commercial complex situated near the new dam. A retail mall would connect the river-edge development with office, parking, and research uses in the Garden sub-area.

4) Mixed-use island - The island scenario encompassed a residential development along with open spaces, extending the Esplanade park system to Charlestown and the downtown waterfront. The new water channel would take on an urban quality, with shops and a hotel along a promenade, and retail and office uses would be developed in the Garden sub-area.

5) Urban basin - This alternative would create a new residential development on the north side of the river with a hotel/mini-convention center on the south bank, establishing a new urban basin relating to the scale and activity of the river.

Of these five alternative development strategies, the "Mixed-use island" approach was felt to have the greatest potential for the revitalization of the North Station area:(1)

1) It developed the site with a mixture of uses - commercial, residential, office, hotel, and open spaces - which would enable the eventual development plan to adopt to changing market conditions. It also would permit different uses to reinforce one another, such as the row of shops next to the riverfront pedestrian promenade.

2) Water-related activities would serve to draw pedestrians through the entire North Station area from the Downtown, thus enhancing the commercial development in the Garden sub-area.

3) This strategy was seen to maximize the water potential by bringing the water "into" the site and increasing access to the river's edge, thereby attracting visitors and nearby residents to the area as well as increasing private investment values for the area.

4) Preparing the waterfront area as early as possible would improve the chances for a more successful project and would quickly improve the area's image, attracting investment to the North Station area and creating additional pressure for the completion of public improvements.

Selection of this development strategy, therefore, established the character of the new urban form which would result from the total redevelopment of the North Station area.

The optional development program is, essentially, a smaller-scale variation of the preferred development strategy. However, while the basic features would remain the same, there are some major differences. The principal changes are that the optional plan would not develop the island for residential use (only the hospital would be located on the island), considerably more parkland and open space areas would be provided, and the housing component would be substantially reduced in size. As a result, the concentrated urban activity associated with the preferred plan would be less intense under the reduced-scale option and the riverfront would have a quality and character much more similar to the present Esplanade fronting the Back Bay and Beacon Hill sections of the river.

The no-build alternative would provide no improvement of the existing negative aesthetic qualities of the project area.

2. Visual and Urban Design Impacts

Since the design plan for the North Station development is primarily conceptual at this stage of project development, a specific analysis of the aesthetic impact of the project would be premature at this time. However, based on the design controls established by the Urban Renewal Plan and the schematic site plan as prepared by Safdie Associates, some generalized analyses can be made.

In general, the preliminary site plan and the Renewal Plan design and development controls would result in a project development similar in scale, proportion, and massing to the neighboring districts, respecting both the mid-rise height and uniformity of the Bulfinch Triangle and the high-rise towers of Charles River Park. The maximum height permitted in the plan is 200 feet, for the commercial/hotel development along the north side of the Storrow Drive Connector ramps and the Boston Garden site development parcel. The maximum height on the island would be 150 feet, comparable to the 170 foot high residential towers in Charles River Park along Martha Road. Along the proposed canal and on the island, buildings are designed to be stepped back, maximizing views from more distant structures as well as reducing the potential shadow impact on pedestrian areas (see Section 4.2 below).

The only building presently designed is the new Federal Office Building, for which Hugh Stubbins and Associates have been selected by the General Services Administration (GSA) as the architects. During the conceptual design phase, three alternative schemes were examined: 1) Scheme "A", an 8½-story low-rise, cubical glass structure, 2) Scheme "B", a mid-rise alternative with a seven-story mid-rise mass diagonally straddling a 4-story base, and 3) Scheme "C", a high-rise tower scheme with a 20-story office tower placed over a 4-story base of public spaces. Following a review of these schemes by GSA and the City, Hugh Stubbins was requested to develop a fourth option, incorporating features of both Schemes "A" and "B". The resulting design is a 4-5-story base with a ground floor lobby/atrium space and an 11-story, L-shaped office wing along Lomasney Way and the internal service road. The major entrance is positioned off Causeway Street, toward the intersection of Lomasney Way. This location provides the maximum distance from the proposed Arena (thus avoiding the potential for serious pedestrian conflicts) as well as responds to a pedestrian desire line through the site for access to the relocated rapid transit and commuter rail facilities. Arcades with retail frontage are developed along both Causeway Street and the public plaza, reminescent of the existing sidewalk treatment of the Boston Garden and Madison Hotel buildings. Service access and loading docks are located off the service road, to minimize disruption of pedestrian movement along Lomasney Way.

The promenade fronting on the southern side of the proposed canal could be considered one of the most prominent visual amenities of the redevelopment plan. Pedestrian easements of at least 50 feet in width would be required for this promenade, as well as along the water edge on the north side of the island; these easements would be landscaped and would be directly connected to existing Esplanade pedestrian and bicycle paths and the landscaped area at the southern end of the MDC dam, and to each other as well. Additional pedestrian easements would be required to connect the island and riveredge development to the Garden sub-area. All pedestrian easements would be completely free of automobile traffic and parking. Retail activities would be required or encouraged to front along these paths and the waterfront promenade to attract maximum activity to these areas.

On the island, a combination of open courts, landscapping, and water orientation for the residential units would create, according to Moshe Safdie, an environment "similar to the Isle St. Louis in Paris". The eastern end of the island, facing the boat locks, would be reserved for an important public building or museum, while service stores and restaurants would be concentrated opposite the public building and on the island's western edge facing the boat canal. A pedestrian promenade would cover the train tracks, which would continue at grade on the existing right-of-way.

Under the present conceptual design, the majority of the housing units on the island would be oriented to the south and west and would be arranged around courtyards to minimize the blockage of views. This south and west orientation would provide the best views from the island, focusing on the promenade, parkland, and new development on the south side of the new channel and on the larger Boston skyline beyond. However, views to the north from the island, as well as from the taller buildings of the mainland, would continue to be negative, since they would overlook the warehouses and storage facilities, railyards, and the operations of Boston Sand and Gravel Company across the river in Cambridge and the network of highway ramps in Charlestown.

A second, potential, negative impact on the project's visual quality could result from the continued existance of the Storrow Drive Connector ramps. However, proposed buildings have been designed to reduce this adversity to the maximum extent. These buildings would be built along both sides of the roadway, thus enclosing that portion of the elevated structure parallel to Causeway Street. On the southerly side are a proposed parking garage and the new Arena, while on the northerly side are mixed-use buildings, with the lower floors abutting the ramps devoted to parking and hotel and commercial functions above.

If the Massachusetts DPW does proceed with the proposed Leverett Circle improvements and relocates the connector ramps, their removal could have a substantial positive impact on the project area (although this impact probably would be minimized by the construction of new buildings immediately adjacent to the ramps). Of the four alternatives studied by the DPW, the tunnel option would be the preferable solution aesthetically, since the river basin would then be substantially free from further visual obstructions. With the bridge options, however, although the view from vehicles on the bridges would be enjoyed, the additional elevated structures would further obstruct the already congested view of the river basin between the two dams (as well as seriously hinder, and probably prevent, the implementation of the island concept). One bridge scheme would retain the existing connector ramps, thus maintaining its current visual impact, while adding additional bridges across the river, compounding the adversity.

With respect to the Central Artery depression proposal, the replacement of the existing high-level bridge over the Charles River with two lower-level bridges (crossing 30 feet above the water surface, with six steel trusses approximately 60 feet tall) would have significant adverse visual impacts. By their intrusion upon the river environment, the proposed bridges would totally destroy the experiential quality of this section of the river while at the same time reducing the attractiveness of the adjacent land area. The prominent placement of the bridges would make them an important visual element and would add visual clutter to the view from the proposed parkway along the riverfront. The new roadway elements also would impede views across the Charles River to historic monuments in Charlestown, although there would be some improvement in views across the river from Causeway Street. At the edge of the Charles River, the bottom of the roadway would be only 15 feet above grade and would create a darker and less attractive river bank than currently exists. Finally, a 10-story, 60-by-80 foot ventilation building proposed next to the MDC Dam access road would be an additional prominent visual element along the waterfront. This proposal also retains the existing elevated Storrow Drive Connector ramps behind North Station.

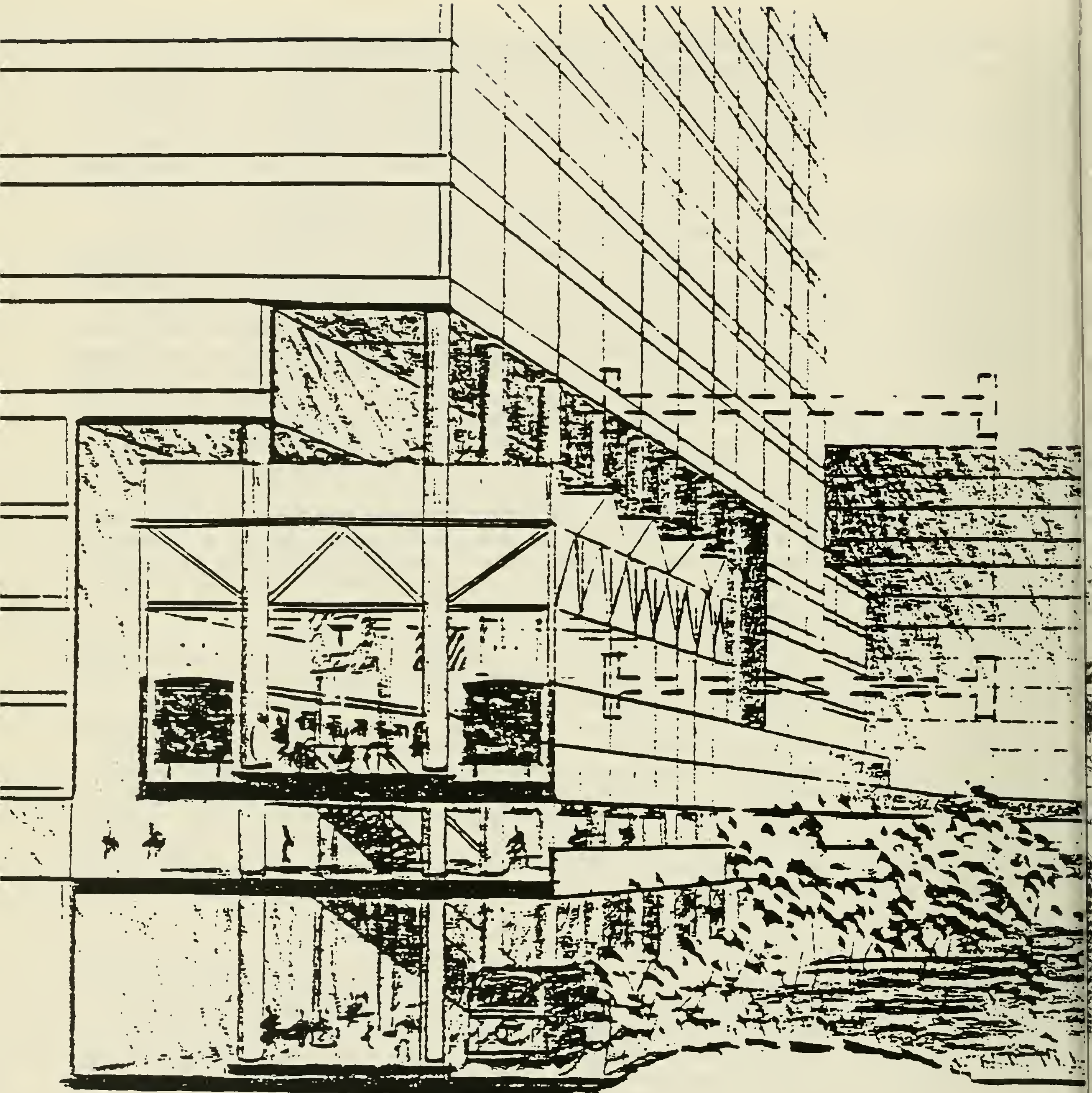
Some minor visual improvements, nonetheless, could be expected. With the removal of the Central Artery elevated structure, Causeway Street would become visually continuous with only the single bridge of the relocated Green Line crossing the roadway overhead. Also, the connection between Causeway Street and the Charles River Dam Park would no longer go under an elevated structure. Rather, it would parallel an open roadway section which is rising to meet the new bridge (however, noise and air quality would be worse than they are at present).

The Green Line relocation options would have similar aesthetic impacts as the highway ramp relocation alternatives. With the subway option, the only portion above grade and, therefore, visible would be the transition section to the Science Park Station. The adverse impacts on the aesthetic environment would be minimized by locating this section of the alignment adjacent to the connector ramp structure along Martha Road and leaving the remainder of the redevelopment area free of any visible transit elements. At the same time, however, it would maintain the current view obstruction from the lower elevations of Charles River Park to the river.

The potentially adverse aesthetic impact of a relocated elevated alignment would be mitigated by the careful location of the structure through an area where it would be least intrusive, by architecturally integrating the alignment within proposed buildings, and by a sensitive design of the free-standing sections to enhance the surrounding environment. The proposed transition zone would be located parallel to Canal Street in the vicinity of the existing MBTA ground-level transit service area, perpendicularly cross Causeway Street, and continue above Accolon Way (a service road) without disrupting its function. The new structure essentially would be removed from street level views. The alignment would then run parallel to the Connector ramps, but would be enclosed within the new Arena and parking garage structure before joining the existing elevated structure at Martha Road (see Figure VI.K-1). By architecturally incorporating the structure within these buildings, any adverse visual impact or blighting influence on the environment would be eliminated for much of its length. Where the elevated structure is free-standing, advances in technology would allow it to be structurally more efficient and, therefore, significantly less obtrusive than its historical prototypes (see Figure VI.K-2). Constructed with long spans and a relatively shallow depth, this structure would be a relatively minor addition to the existing visual disruption caused by the ramps. Moreover, it could be designed to highlight points of passage under the ramps to the Phase II development parcels and to be integrated with the pedestrian and landscape patterns as part of an active urban environment.

The third option under consideration - maintaining the existing alignment above Causeway Street but upgrading the physical structure by relocating the existing station and removing unused non-structural facilities - would reduce its massiveness and strong negative image. Intergration of this "lightened" elevated structure with street-level activity patterns could eliminate the present ambiguity of spaces under the structure and highlight points of passage and visual connection. Nonetheless, the continued presence of the structure still would most likely impede any significant revitalization or economic improvement of the project and adjacent areas for the foreseeable future.

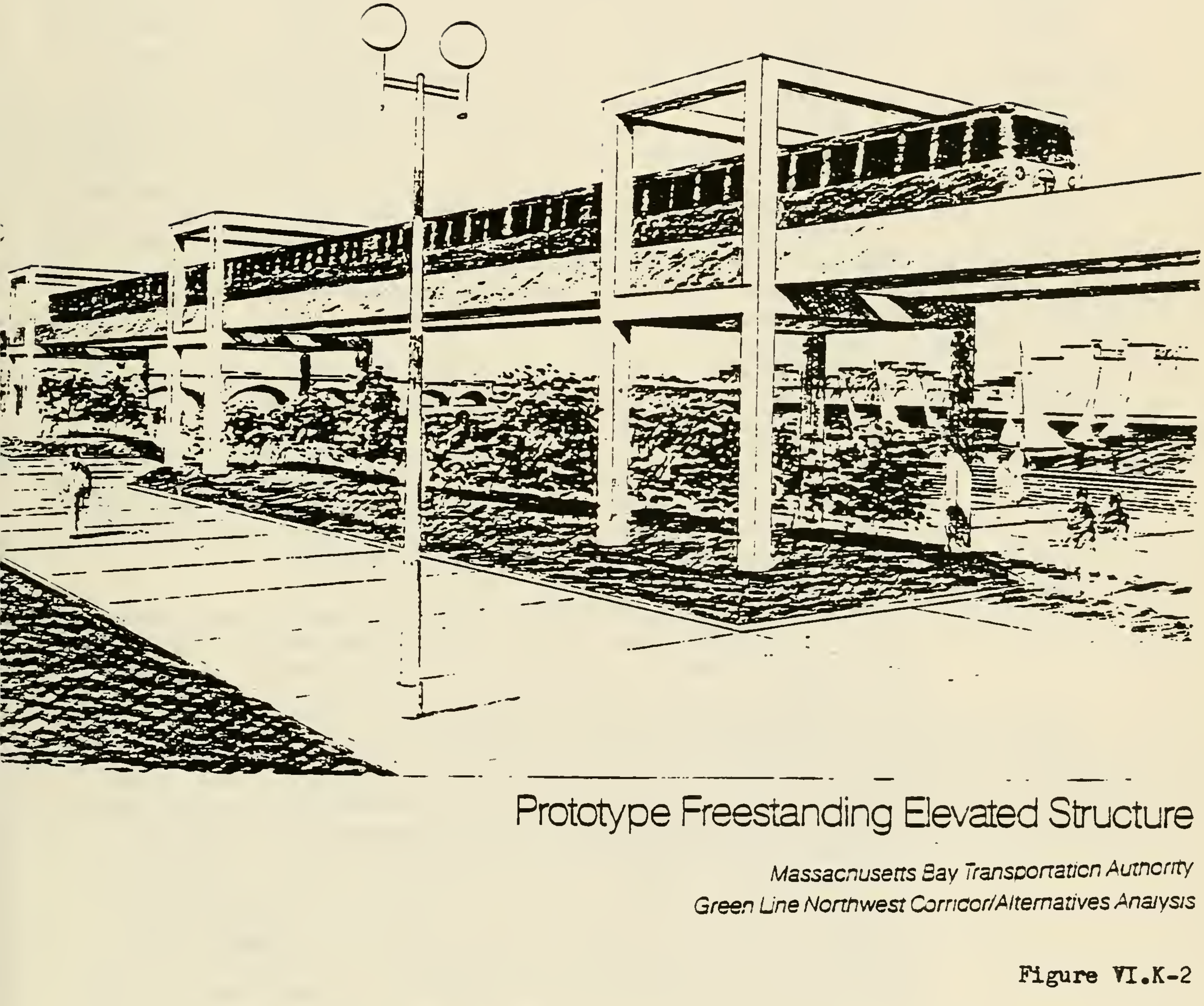
The reduced-scale optional plan would have the same design and aesthetic impacts for the Phase I area and the transportation-related improvements as the preferred program, but some major differences would occur on the Phase II area. With less intense development much of this sub-area, and particularly the island, would remain open but would be extensively landscaped. The two buildings to remain - the Registry Building and the Rehabilitation Hospital - would be surrounded by large areas of parkland and the island itself, except for the hospital and some surface parking, would be essentially a public recreation area. Along the Storrow Drive Connector ramps would be designed stepped structures similar to the preferred plan, with parking on the lower levels and retail opening onto a canal-front promenade which continues the Esplanade walkway system. The



Prototype Integrated Elevated Station

Massachusetts Bay Transportation Authority
Green Line Northwest Corridor/Alternatives Analysis

Figure VI.K-1



Prototype Freestanding Elevated Structure

Massachusetts Bay Transportation Authority
Green Line Northwest Corridor/Alternatives Analysis

Figure VI.K-2

view from the proposed housing, however, would be mixed - in the short-range would be the parklike setting of the mid-river island but the more distant views would be the unattractive warehousing and industrial activity on the Cambridge side of the river and the highway ramp system in Charlestown. In character, the lower half of the project area would exhibit urban qualities and the current downtown mix of office, commercial, and residential activity, whereas the island and western segment of the project would have the more open qualities of the Esplanade park system.

Without public assistance or unforeseen market growth, it is not anticipated that extensive investment would be made in the near-term future to improve the visual and design qualities of the area. While some rehabilitation (for example, improvements to the Boston Garden) or expansion (such as the new addition to the Rehabilitation Hospital) might occur, the predominance of open parking lots and an unattractive image overall could be expected to continue. Existing undesirable views would remain unchanged. The no-build alternative also would not remove the negative effects of the elevated transit structure and would most likely inhibit the opportunity to redevelop this aesthetically degraded area. On the other hand, this alternative would preserve the Boston Garden/North Station building and the Madison Hotel, which, although not architecturally distinguished, do exhibit some notable Art Deco ornamentation and a style unusual for Boston.

As of now, the North Station project area does not have a coherent, unified, and harmonious urban design pattern. The quality of the future visual image of the project will be dependent upon the architectural and design review procedures and standards to be applied by the Redevelopment Authority upon the scale, form. bulk, materials, and colors of the buildings yet to be designed and upon the inter-relationships of such buildings and the total redevelopment area.

Development and design controls for the planned development have been established as part of the Urban Renewal Plan, and more specific design guidelines will be prepared for each development parcel. All proposals will undergo design review by the BRA, thereby assuring compliance with the design policies and the attainment of acceptable urban design objectives as set forth by the Authority. As noted above, these objectives include landscaped pedestrian easements along the edges of the river and the proposed canal, pedestrian easements connecting both sub-areas of the project, retail activities oriented toward public plazas and walkways, and a respect of the open space along the river through ample setbacks and a stepped-up design for buildings located on adjacent parcels. Moreover, open spaces and plazas would be integrated into the site plans to satisfy the requirements for open space for the area's populations. Adherence to these guidelines and controls would maximize the beneficial aesthetic impacts of the proposed development. In addition, the Renewal Plan requires that 1% of construction costs be devoted to works of art in accordance with policies established by the Authority.

3. Historical and Archaeological Impacts

In accordance with Section 106 of the National Historic Preservation Act of 1966 (P.L. 89-665), as amended, and implementing regulations of the Advisory Council on Historic Preservation (36 CFR Part 800 et seq.), the proposed North Station redevelopment project was reviewed with the Massachusetts State Historic Preservation Officer. Following careful review of the material submitted, it was determined that the proposed redevelopment activities would not affect any significant cultural, historical, or archeological resources and that no further compliance with Council procedures was required (Appendix Q-1). Similarly, the Green Line relocation proposals also were reviewed by the SHPO and a determination of no effect on the Bulfinch Triangle area or the Charles River Basin Historic District was made (Appendix Q-2).

In general, the overall impact of the North Station project on adjacent historic properties is anticipated to be positive. While some temporary, but reversible, adverse impacts could occur during the demolition and construction phases, they would cease to exist with the conclusion of these phases. Long-term effects should be beneficial. By revitalizing the project area and improving market conditions, especially with the removal of the blighting influence of the Green Line elevated structure, the North Station project should increase the likelihood that the neighboring structures of the Bulfinch Triangle area would be rehabilitated and preserved, thus enhancing its historic character. On the other hand, full implementation of the project (either option) as currently proposed would require the demolition, and hence irreversable loss, of both the Boston Garden and Madison Hotel buildings, which, although not considered eligible for National Register or Boston Landmark status, do exhibit some architectural value as notable early examples of the Art Deco style.

With the no-build alternative, there would be no short-term impacts due to construction activities. In the long-term, however, particularly if the Green Line elevated structure is not removed, revitalization of the North Station area would not be expected to occur and the existing elevated would continue to blight the historic Bulfinch Triangle area.

4. Wind and Shadow Impacts

4.1 Wind Impacts

Characteristics of Wind

The determining criteria as to whether a development proposal will adversely impact the grade level wind environment is the extent to which the wind condition on the site before development may be aggravated (or improved) by the configuration of the proposed development. Atmospheric winds vary from one geographic location to another, both on the macro-scale (regional) and micro-scale (local) levels. Local wind conditions are determined by the topography, details of buildings, foliage concentrations, and the presence of other nearby structures.

Wind, in particular, is a function of a building's height relative to its immediate and general surroundings. In general, tall buildings have the effect of deflecting the higher-speed winds that develop aloft down to the street level, thus increasing the existing wind velocity at points on the ground plane as much as two or three times ambient speeds. The pressure exerted on a building varies with wind velocity, and pressures will be greater near the top of a building than near the bottom. As a result of the vertical pressure gradient, the air flows down the building from the high pressure to the low pressure region. This phenomenon causes wind speeds at ground level that are normally associated with higher elevations.

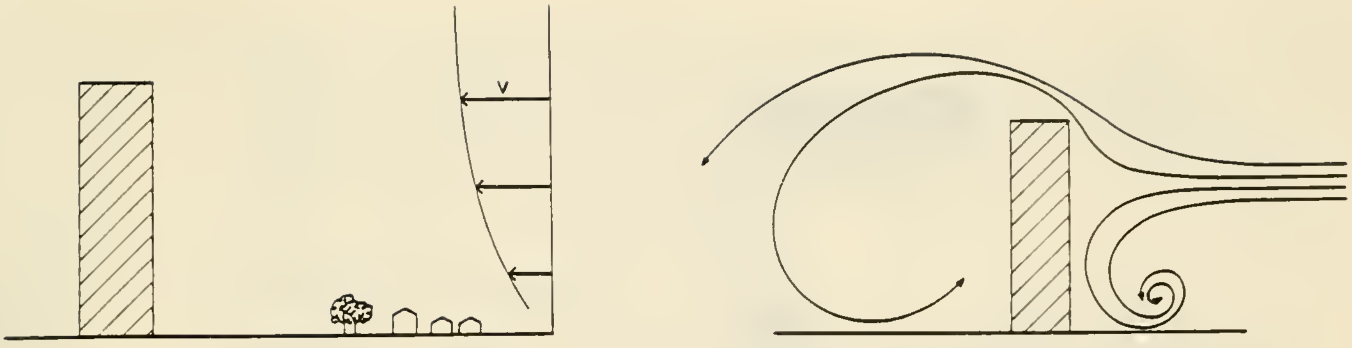
High winds at ground level are most pronounced where tall buildings are surrounded by very low buildings (as, for example, at the Prudential Center and at the John Hancock Tower). At ground levels, these higher winds are accelerated around the corners of a building, producing even higher wind speeds. This corner flow is usually a steady high speed wind that changes to gusty wind as it moves farther from a building.

In addition, wind channeling can occur when two structures are adjacent to each other and are separated by a distance that is small compared to the height of the structures. Generally, the severity of channeling increases as the height of the structure increases, as the spacing between the structures decreases, and as the surface presented to the wind increases.

Another phenomenon is the formation of a vortex, which occurs when relatively tall structures are located in close proximity and particularly when they form a "U". In this case, the "U" can serve as a vortex site when winds blow into it obliquely.

The characteristics of wind in relation to buildings are illustrated in Figures VI.K-3 and VI.K-4.

In general, pedestrian level winds at speeds over 10-15 miles per hour should be regarded as potentially troublesome in terms of pedestrian comfort and the movement of dust and trash. Wind



The natural wind velocity profile. Topographical features such as buildings, trees, hills, etc. affect the shape of the velocity profile.

Typical air flow pattern in front of wide building.

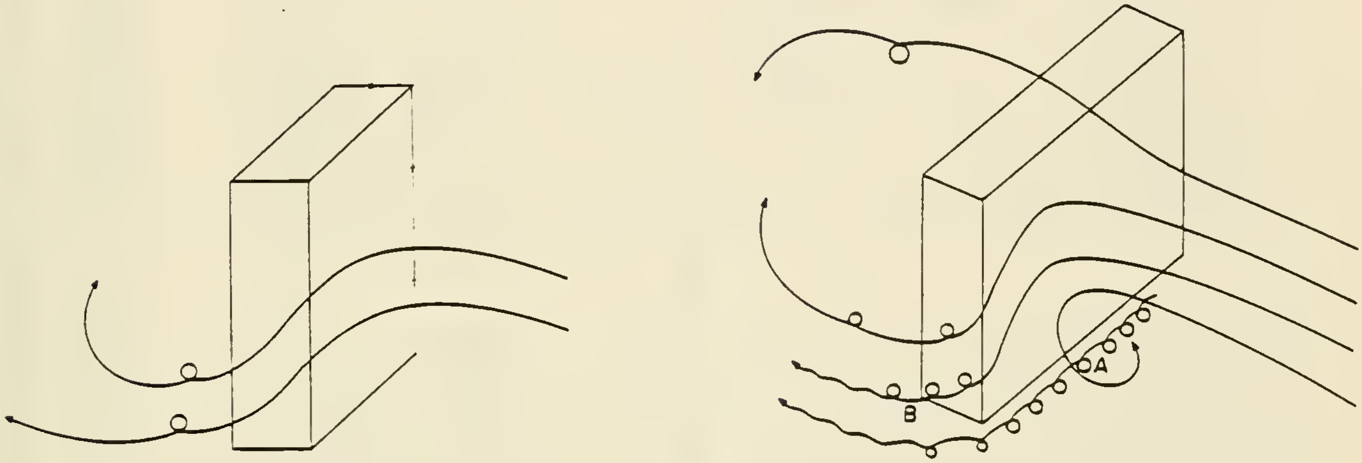
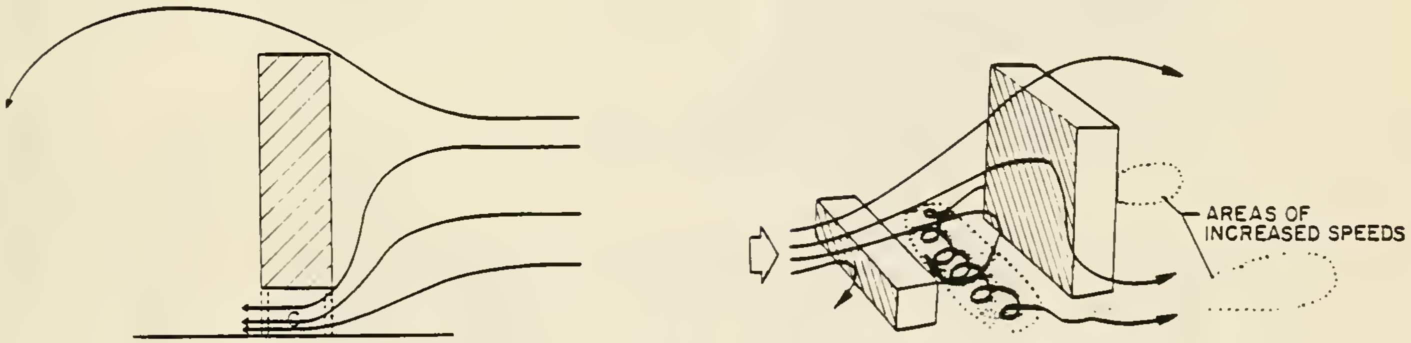


Illustration of air flow near a corner of a building.

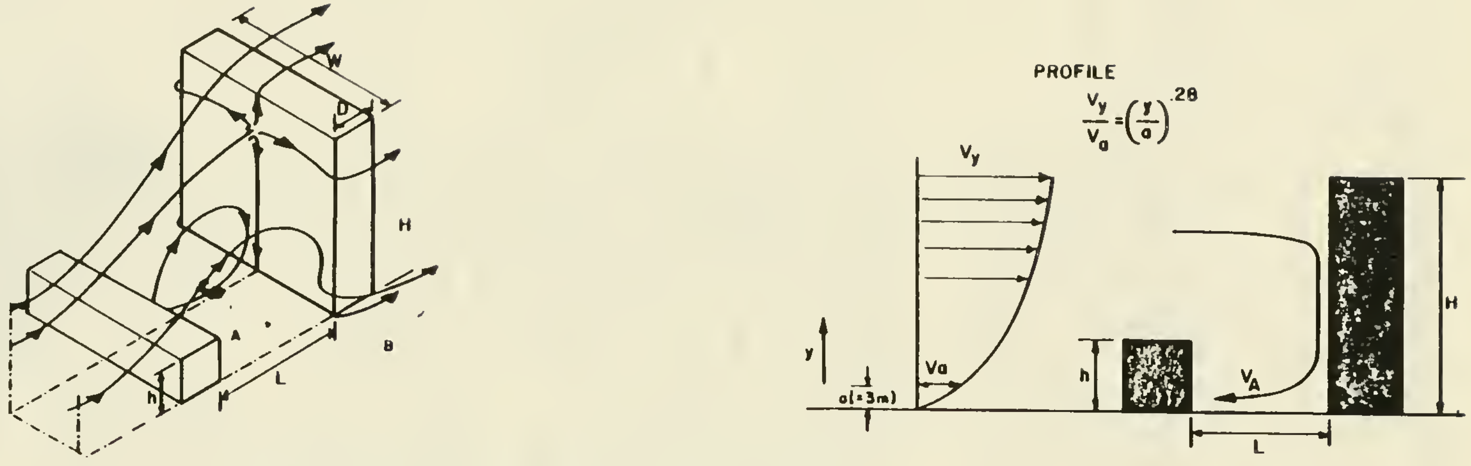
Air flow patterns associated with a wide building.



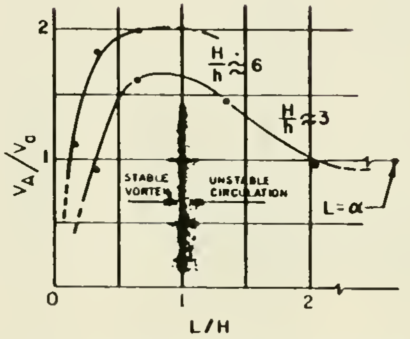
Air flow pattern at building with a underpass.

FLOW PATTERNS BETWEEN HIGH AND LOW-RISE BUILDINGS

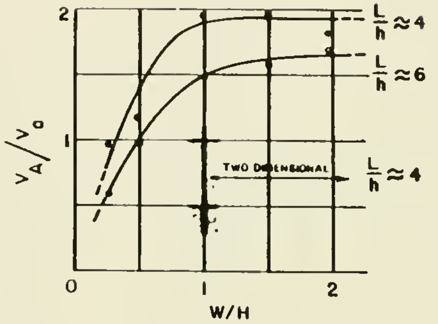
Figure VI.K-3: WIND EFFECTS OF TALL BUILDINGS



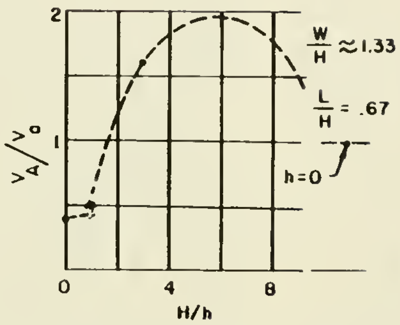
SCHEMATIC FLOW PATTERN AND DEFINITION OF TERMS



EFFECT OF SPACING (LH) ON PEDESTRIAN WIND BETWEEN BUILDINGS



EFFECT OF FACE WIDTH ON PEDESTRIAN WINDS BETWEEN BUILDINGS



EFFECTS OF RELATIVE HEIGHTS ON ON PEDESTRIAN WIND SPEED BETWEEN BUILDINGS

Figure VI.K-4: CHARACTERISTICS OF WIND/BUILDING INTERRELATIONSHIPS

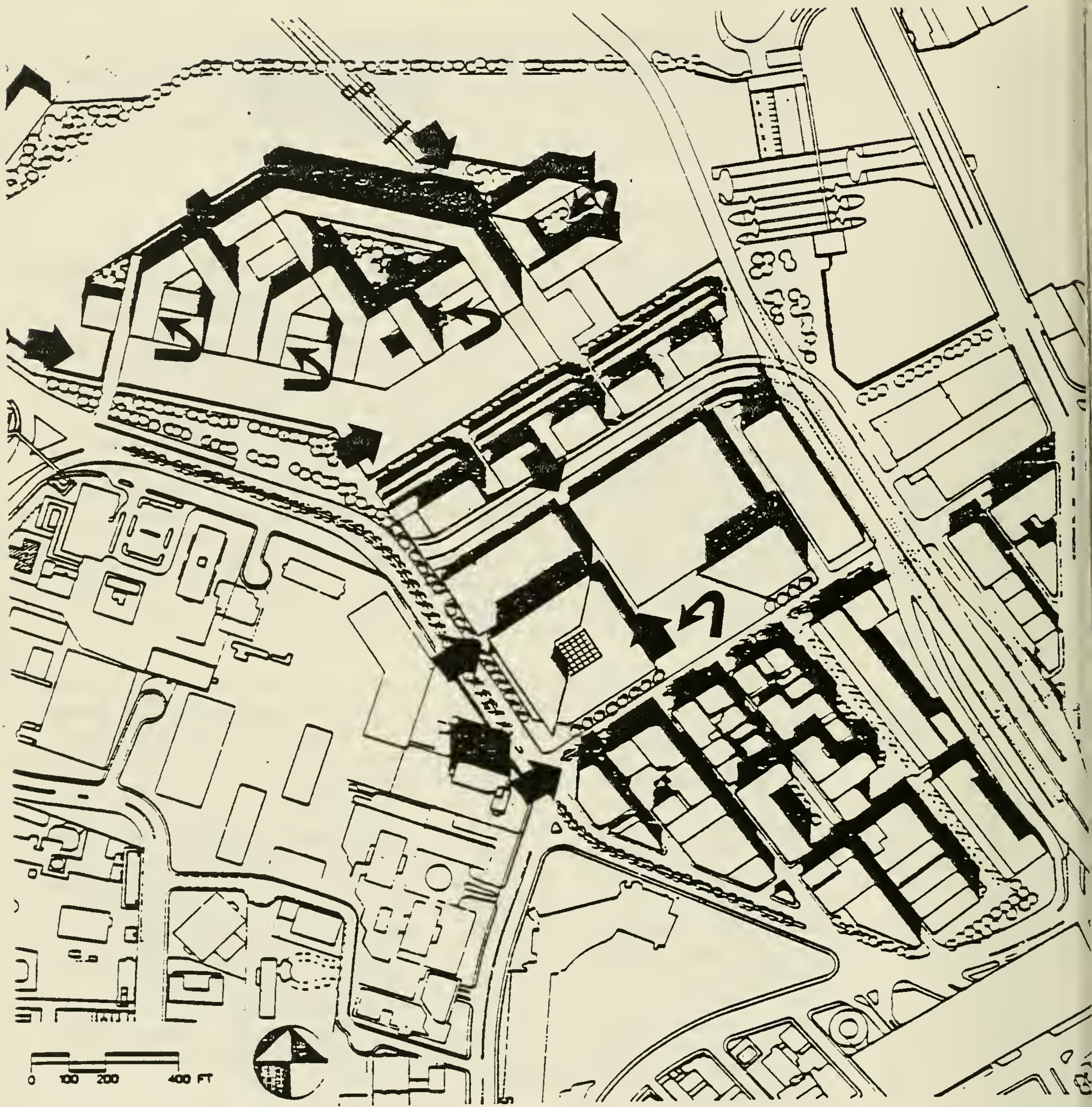
speeds in excess of 25 miles per hour are likely to cause hazards to pedestrians as well as discourage outdoor recreational activity, particularly during cloudy and cold weather. Hence any building or group of buildings more than a few stories high must be placed carefully to minimize any acceleration of wind at pedestrian levels.

Project-related Impacts

A detailed study of the potential wind effects of a development the size of that proposed at North Station would require the construction and testing in a wind tunnel of complete scale models of the project. Such an approach is beyond the scope of the present assessment - which does not propose a specific design but attempts to anticipate the scale and type of future development - and would be premature until more specific plans have been developed. Nonetheless, estimates of major wind effects can be made from simple plan studies and can serve to indicate possible areas of wind effect problems. For this purpose, the two most important wind effects would be channeling and vortex formation. In general, since the maximum height permitted by the Renewal Plan is 200 feet (20 stories), but actual height would probably be nearer 10-15 stories, the adverse wind conditions normally associated with high-rise buildings would be less likely to occur.

Within the Phase I development area, there are two major potential sites for wind channeling and one site where vortex formation could occur (Figure VI.K-5). The most serious wind channeling site is the pedestrian walkway between the new Arena and the parking garage and adjacent Federal Office Building, which would be impacted by the dominant northwest winter winds. This channel effect could be further aggravated by the constricting influence of the Storrow Drive Connector ramps which pass over this pedestrianway. The second wind channel site would be the relatively narrow space between the Federal Office Building and the parking garage, where the summer southwest wind would predominate (the actual impact, however, might be lessened due to the presence of the Charles River Park parking garage opposite this areaway). In addition, both Causeway Street and Lomasney Way would act as channels for southwest (summer) and northwest (winter) winds respectively, which could cause inconvenience to pedestrians.

The major vortex site would be the proposed public plaza between the GSA building, the Arena, and the private office building (or hotel). Vortex formation could be caused by southwesterly winds (and to a much lesser extent by northeasterly winds) channeled down Causeway Street, and more particularly by the strong northwest winds channeled through the pedestrian passageway leading off the plaza. The velocity of the northwest wind would be accelerated by this pedestrianway, resulting in unpleasant wind conditions and frequent



➡ Wind Channeling

↰ Vortex Formation

Figure VI.K-5: POTENTIAL WIND EFFECTS PREFERRED DEVELOPMENT PROGRAM

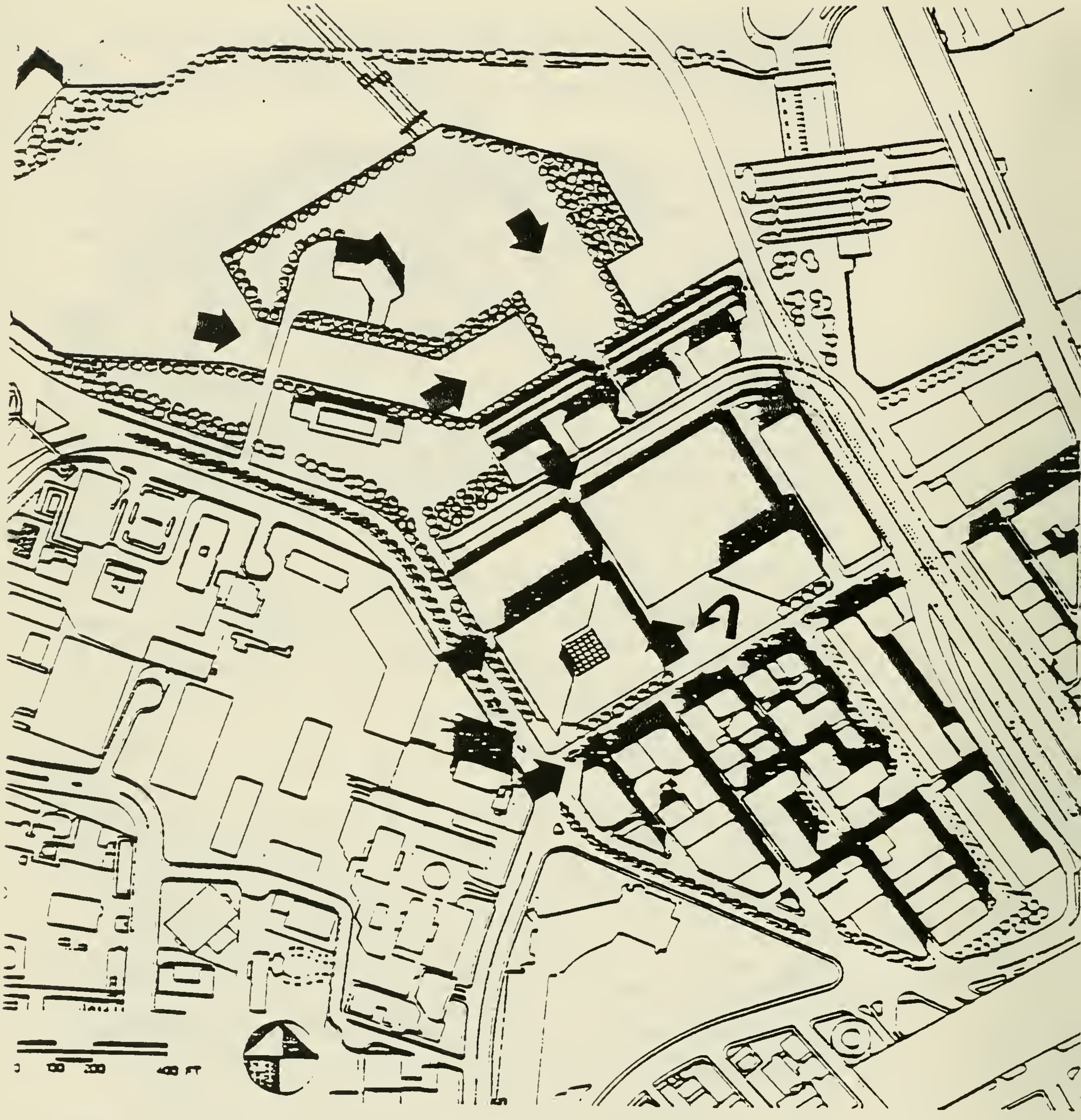
blowing about of dust and trash within the plaza. Covering this pedestrianway and similar architectural adjustments, however, could significantly reduce this impact and alleviate the problem.

In the Phase II area, potential channeling sites include the narrow space between the housing and public/museum structure on the island, where the winter northwest winds would dominate, and, to a lesser extent, along the proposed canal (westerly and southeasterly winds). Vortex formation could be expected in the residential courtyards with westerly and southeasterly winds and in the museum courtyard with easterly winds. Since these are primarily late spring/summer/early fall winds, their effects would not be entirely adverse and, in fact, would be welcomed during hot summer days. On the other hand, the location of the island in the river, and the relatively open or low density development to the immediate north and west, would subject the housing and the northerly and westerly sides of the island to the strong winter winds with little protection (a factor which also could adversely affect energy requirements for these structures).

With the reduced-scale, optional development program, future wind conditions in the Phase II area would remain basically as they are today, since much of the area would retain its present open character and thus be subjected to the normal windiness of the Boston region, particularly from the winter westerly/northwesterly winds (Figure VI.K-6).

The no-build alternative would have no effect on existing wind conditions.

The above analysis, by describing the potential effects of an illustrative site plan, can be useful in developing design guidelines for the future development to ensure that the actual site plans minimize the type of wind impacts anticipated. General types of mitigation measures are available. These include specific architectural treatments such as protecting grade level areas by means of arcades, canopies, or sheltered spaces, setting back of high-rise elements from lower building masses, and designing building facades to break up the wind impacting on the surfaces. As an example, the setback design of the structures along the southerly edge of the proposed canal, in which tiered buildings step up from the promenade with the high-rise element furtherest from the promenade, should act to minimize potential wind impact. Along sidewalk areas and the pedestrianways, and at the boundaries of development sites, extensive tree planting can divert or dissipate strong winds at pedestrian levels. Landscaping and tree planting would be especially important along the canal and river edges and in other open areas. Large trees (35-45 feet in height) in leafless condition (to represent worst-case winter conditions) have been shown, in recent wind tunnel



➡ Wind Channeling

↩ Vortex Formation

Figure VI.K-6: POTENTIAL WIND EFFECTS
OPTIONAL DEVELOPMENT PROGRAM

studies of the Copley Place project in Boston, (2) to be able to reduce winds by 5%-15%, with much greater reduction expected during the seasons when the trees have full foliage. The effect of tree planting, however, depends to a large extent on the location, density, and configuration of the planting. It should be noted that, as part of the project's landscaping plan, extensive tree planting is contemplated along public sidewalks and pedestrianways and the waterfront promenade.

4.2 Shadow Impacts

Nature of Shadows

Shadows have both positive and negative qualities. In the summer, they provide relief from the sun's direct rays and reduce street level temperatures. In the winter, however, shadows result in increased ice and frost and place additional heating demands on shielded structures. Year-round, a total loss of sunshine limits landscaping options and is generally regarded as aesthetically and psychologically undesirable. In addition, access to solar radiation is of prime importance as solar energy emerges as a feasible and efficient means of water heating and space conditioning.

Shadow impacts are a function of the location, orientation, and height of a building with a particular area. The taller the building, the longer the shadow that would fall on adjacent properties and open spaces. Shadow impacts vary with the season of the year and the time of day, being related to the azimuth and altitude of the sun, but they can be plotted once the shape and size of a proposed building is known.

Project-related Impacts

Since the project design is still in a conceptual stage, a detailed shadow analysis would not be valid at this point in time. However, some very preliminary studies were undertaken in order to evaluate the current design for potential negative effects. Of primary concern is the maximization of direct solar radiation on public open spaces such as plazas, promenades, parks, and courtyards. For this analysis, shadow path observations were made for June 21, May 21/September 21, and December 21 - the days when the sun's altitude normally is highest, midway, and lowest in any given year - for three times of the day - 9:00 a.m., 12:00 noon, and 3:00 p.m.

The principal areas of concern in Sub-area I are the public plaza off Causeway Street and the pedestrian arcade leading to the Phase II development area. The public plaza would be impacted both by the GSA building and by the existing buildings on the southerly side of Causeway Street. (A structure on the development parcel adjacent to Accolon Way, as this parcel is presently designed, would have minimal, if any, impact due to its shape in relation to the sun's orientation.) The major shadow impacts would occur during the winter months, when the sun is lowest in the horizon, which is also the period when the sun would be most welcomed. Shadowing would result from the buildings on the opposite side of Causeway Street during the morning hours, the extent decreasing as the morning progresses, with minimal shading along the Causeway Street edge by noon. During the afternoon, however, the Federal Office Building would begin to impact the plaza, placing nearly half the plaza in shadow by mid-afternoon. During the spring and fall months, the plaza would experience minor shadowing during the early morning and late afternoon from the Causeway Street buildings and during the afternoon from the GSA building; and during the summer by the GSA building only, but to a much lesser degree.

The public arcade between the Federal Office Building/garage and the Arena, because of its narrowness and the height of the adjacent buildings, would be in shadow for much of the year, with the least shadowing occurring on the summer months. Sunlight could penetrate this area only during the early morning hours of the winter season, early to mid-morning during the spring and fall, and during the morning and early afternoon in the summertime.

In Sub-area II, the promenade along the proposed canal would be the major area of concern. At the 200 foot height allowed by the Renewal Plan controls for the buildings along the promenade, most of the waterfront pedestrianway would be in shadow for much of the day throughout the year, even assuming a setback of the high-rise element from the promenade, as illustrated in the site plan (Figure III-7). During the winter months most of the promenade would experience shadowing nearly the entire day. In the spring and fall, adverse shadows would occur until mid-afternoon, while only during the summer would sunlight cover the promenade by mid-morning. Moreover, the south-facing island housing along the canal edge would fall within the shadows of the high-rise elements during much of the winter day, clearly an adverse impact.

By reducing the height of the high-rise element, however, substantial improvements can be made. At a maximum height of 100 feet, the promenade would be in sunlight for most of the day (except early to mid-morning) during the spring/fall seasons and nearly all day during the summer. The walkway still would be shadowed by the high-rise element for most of the day during the winter, except for the water edge in the mid to late afternoon, but the island housing would only be minimally impacted in the early morning hours. At a height of 150 feet, however, there would be minimal improvement overall (from a 200 foot height) in the shadow impact on the promenade - the sun still would be absent for most of the winter months but would arrive somewhat earlier during the spring and fall and the summer. The island housing would be impacted until the late morning hours in the winter.

Under the optional development program, Phase I impacts would be the same, but Phase II impacts would be somewhat modified because of the less intense development. The impacts along the promenade generally would be similar but to a lesser extent, since the promenade would be wider, allowing a greater area to receive sunlight, and a lesser number of structures would cast shadows. However, shadows from the existing Registry Building, which would remain, would adversely affect portions of the promenade near this structure, especially during the winter months, and would result in a less favorable situation than the preferred development plan.

The no-build alternative would not result in any change in shadow impact over the existing conditions.

L. Socio-Ecomomic Impacts

1. Community Characteristics

The nature of the development proposals for the North Station project area - office, retail, hotel, residential, entertainment, and parking - does not differ significantly from the current use of the area. All of the same uses are present in the North Station area today, albeit, in some cases, of a much different character. Physically, the preferred development program would replace much of the open parking area with new construction, resulting in a much more intensely built-up character than presently exists. The reduced-scale program, on the other hand, would retain a greater portion of open space in the project area by converting the open parking into a riverfront parkland. It is this parkland (which also is an element, though to a lesser degree, of the preferred program) which would represent the most significant alteration to the present use of the project area.

Socially, however, implementation of the project will result in more significant impacts. Both development options necessitate the displacement of all residents in the area and many of the existing businesses (the Boston Garden functions, the commuter rail terminal, and some of the businesses related directly or indirectly to these activities would be relocated within the new development, and the reduced-scale program would retain the Rehabilitation Hospital). The new commercial and office spaces most likely would not be affordable by most of existing small businesses in the area, which are characterized by low sales volume per square foot and low rentals. In addition, the North Station project (preferred program) would create a community of an estimated 1,925 residents distinctively different in character from the present 106 residents, who generally have low or moderate incomes or are retired, are elderly, and have had a rather lengthy residence in the area. The reduced-scale program, while providing for a much smaller residential population of an estimated 525 persons, would nevertheless result in a similar character of residents as the preferred program.

2. Displacement and Relocation

2.1 Residential Displacement

Implementation of the North Station redevelopment project would require the displacement and relocation of the estimated 68 households (106 persons) presently residing in the Billerica Street blocks, the site of the proposed Federal Office Building and Arena garage. In accordance with an agreement with the General Services Administration, the relocation of these residents will be the responsibility of the Boston Redevelopment Authority. It is estimated that the actual displacement will take place over a 6-9 month period, following commencement of property acquisition.*

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* Relocation actually began in April, 1982, and has been nearly completed.

Relocation of residents will be carried out in full compliance with regulations identical to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 USC 1601 et seq.) and with Chapter 79A of the Massachusetts General Laws, as amended, and the rules and regulations of the Bureau of Relocation issued thereunder. The primary goal of the Authority will be to assist all occupants in relocating to other satisfactory housing with a minimum of disruption and the maximum of assistance and benefits to achieve this end. Substantial relocation assistance, including moving payments and replacement housing payments, are now available to help defray all necessary relocation costs for the displaced households.

As noted previously, there are a significant number of older residents in the project area - nearly 30% of the households have one or more members aged 62 or over, with many considerably older than the Federal definition of elderly. Many of the residents are retired, and those that are working have modest incomes. The size of the apartments generally are small, with the majority having not more than two bedrooms. Rents are considerably lower than those now available in the private market in adjacent residential areas, probably attributable to the size and age of the buildings and the comparative isolation of the housing within a non-residential section surrounded by heavily-used streets and transit systems.

Table VI.L-1

NORTH STATION PROJECT

Households by Size of Relocation Unit (BRs Needed) and Income Level

Income Range	Studio	1 Bedroom	2 Bedrooms	3 Bedrooms	Total
Low (12)	2	13	2	1	18
Moderate (4)	6	13	4	1	24*
Private (2)	1	13	4	4	22
Market (1)	-	3	1	-	4
Total	9	42	11	6	68

() = Number of elderly households by housing cost level

* = Three minority households

Several low to moderate income relocation housing resources are available in nearby neighborhoods, some or all of which include Section 8 or other subsidy programs. These include:

West End	Blackstone Apartments (E)	121 units
	Amy Lowell House (E)	151 units
Beacon Hill	Anderson Park	64 units
	Bowdoin Apartments	35 units
North End	Ausonia House (E)	100 units
	Paul Revere Courts	31 units
	Casa Maria (E)	75 units
Waterfront	Mercantile Building	122 units

E = Elderly housing

For older residents with strong ties to the area, the Amy Lowell House and the Blackstone development are very important resources. Many residents from the neighborhood and from the old West End already have been able to move there.* Moreover, households being displaced from the project area are eligible to receive priority consideration for any HUD-assisted housing; this should facilitate their placement in such units.

For those displacees not eligible for or not interested in assisted housing, there is a reasonable supply of private-market rental apartments in the surrounding areas, including Beacon Hill, Charles River Park, and the North End. Present owner-occupants and others wishing to purchase should be able to do so also, although the likelihood of purchasing may be conditioned upon the rate and availability of mortgage financing. Moreover, purchase and occupancy of similar three- or four-unit buildings might require moving to other neighborhoods in Boston, since the supply of such buildings in the areas adjacent to North Station is both limited and costly.

No other residential displacement by other governmental action has been identified for this area at this time, thus avoiding any additional publicly-engendered demand for the resources cited above.

The residential relocation impacts would be the same regardless of the developed alternative chosen for implementation. No residential displacement would occur in the no-build alternative.

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* Several of the elderly residents from the North Station project area also have been relocated to these two developments.

In order to mitigate the loss of the project area's low-income housing resources, the BRA has agreed with a request of the North Station Project Area Corporation to provide suitable replacement housing within or near the North Station/Bulfinch Triangle area. Proposals for new construction, conversion/rehabilitation, or a combination were requested for a project containing a minimum of 43 subsidized and market units in July of 1981, and three proposals were submitted in response and were reviewed by the Authority and the PAC. The ability of the private market to provide this housing, however, depends to a large degree on market financing conditions and the availability of housing assistance programs, many of which are being modified by Federal cutbacks as well as by funding limitations on the municipal and State levels.

2.2 Business Displacement

Under the preferred development plan, all businesses presently located within the North Station project area would be displaced by the redevelopment proposals (Table VI.L-2). Within Sub-area I, businesses located on the Federal Office Building site would be relocated by the BRA and those in the North Station/Boston Garden building by the proposed Arena Authority. The relocation of those concerns located in Sub-area II most likely will be the responsibility of the BRA.

Currently, there are 30 businesses and 11 outdoor advertising displays which would be displaced from Sub-area I. These businesses include 4 parking lots, 3 office tenants, 3 restaurants/bars, 3 wholesale/storage operations, 1 training program office, 14 retail businesses, the MBTA commuter rail terminal and the Boston Bruins/ Garden staff.

The total amount of space occupied by the 25 businesses, exclusive of the Arena and parking lots, is approximately 42,870 square feet. Total employment is estimated at 277 persons. Ten firms are owners of their property.

Displacements within Sub-area II include one commercial parking lot and the MGH employee parking lot, 5 outdoor advertising displays, the Edison steam generating plant, and the Massachusetts Rehabilitation Hospital with 780 employees. A long-term care facility, this hospital has 284 beds and an occupancy of over 90%. The Massachusetts DPW and Registry of Motor Vehicles, which employ approximately 900 persons at the Registry Building on Nashua Street, will be vacating this building when the new State Transportation Building in Park Square is completed late in 1983. The future reuse of this building, if any, is undetermined at this time.

A survey of the streets in the immediate vicinity of North Station, as well as conversations with real estate brokers in the area, has indicated that there is over 23,000 square feet of ground floor space presently available which could be used by the displaced

Table VI.L-2

Business Displacement - North Station Project

Activity	No. Of Businesses	No. of Employees Affected	Total Square Feet to be Displaced
Sub-Area I			
Office	3	21	1,440
Retail Sales	14	78	23,430
Restaurant/Lounge	3	40	13,500
Wholesale/Storage	3	7	2,100
Educational	1	10	2,400
Transportation	1	14	1,000
Sports/Entertainment	1	100	400,000
Parking Lots (commercial)	4	7	172,175
Outdoor Advertising Display	11	NA	NA
Sub-Total	41	277	616,045
Sub-Area II*			
Medical	1	780	153,180
Utility	1	2	14,350
Parking Lot (commercial)	1	-	126,275
Outdoor Advertising Display	5	NA	NA
Sub-Total	8	782	293,805
Total Displacement	49	1,059	909,850

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* Does not include the Massachusetts DPW and Registry offices employing 900 persons, which are relocating outside the project area independent of the redevelopment project.

firms. This space is similar in nature to that being acquired and thus is likely to be comparable in per square foot costs. As there are no other active projects underway in the area at this time, it is not expected that there would be competing demands for commercial or retail locations. Moreover, retail space will be included in both the Federal Office Building and the new arena facility and could serve as relocation resources, particularly for those businesses presently located in the North Station/Boston Garden building (this building will remain until the new arena is completed). It is expected that some of the firms now located in the Garden Building, especially those related to sport activities, would relocated to the new arena, as would the Boston Bruins and Celtics organizations and the Garden management offices.

Only three firms have special needs with regard to zoning and licensing - all three are restaurants with liquor licenses. As with all displaced firms, every effort will be made to assist these businesses in locating suitable relocation sites.

The reduced-scale, optional development program would require the same displacement in Sub-area I as the preferred program, but only the parking lots would be displaced by Sub-area II development. As noted above, the DPW and Registry are relocating independent of the proposed project, but this building would then be available for continued office use by either the public or private sector.

The no-build alternative would not require any relocation of businesses from the area.

3. Social Impacts

3.1 Population Characteristics

Although the build alternatives would significantly increase the resident population of the project area, by over 18 times with the preferred program and 5 times with the optional program, the increase on a city-wide basis would be nearly imperceptible. Many of the residents could be expected to be new to Boston. Moreover, since much of the proposed housing probably would be luxury housing and/or condominiums, and would be constructed at a late stage of project development, none of the present residents would be likely to occupy any of these units.

The nature of much of the proposed housing also would affect the mix of the population. Characteristics of residents of this type of housing include high incomes, small households size, few children, primarily professional occupations, no special concentrations of ethnic or minority groups, and a high degree of mobility. In general, this new population would tend to be younger and of a different educational background and socio-economic category than the present residents. However, some market-rate and even subsidized housing could be provided in the North Station development, creating a housing mix not unsimilar to that of the Downtown Waterfront area. Since the current residents would be relocated from the project area at the beginning of the project and the new housing construction would occur late in project development, the new residents would have no direct impact on the current population mix.

Under the no-build option, little change would be expected in the population mix of the area. The low rentals and housing characteristics would be expected to continue to attract low- to moderate-income residents.

3.2 Housing Needs and Supply

Boston's current housing supply is estimated at 245,700 units. Although, according to the 1980 U.S. Census, the city's population has declined by approximately 78,000 persons in the past decade, the demand for housing still exceeds the available supply and this imbalance is expected to continue for the next several years.

Two primary demographic factors are responsible for an increasing demand. First, a growing proportion of the national and local population is twenty years of age or older (the much-heralded post-war baby boom), implying more households. According to the BRA Research Department demographic projections, the number of persons in the 20-24 year age cohort - the household formation group - is expected to increase in number by over 30% by 1985. The second factor is the trend toward smaller household size, increasing the number of dwellings sought by a given population. Several factors compound this trend: a tendency on the part of young adults to forego or delay both marriage and children, an increasing number who desire and can afford separate housing, the rising divorce rate, and more elderly persons who seek to live independently. Since 1960, the number of persons per household in Boston has declined from 2.91 to 2.42 today. In addition, the growing attractiveness of urban housing and an increasing disenchantment among many households with suburban living, together with dual concerns of rising energy and transportation costs, are also placing new demands on Boston's housing stock.

These trends are expected to continue well into the 1990's. Although the post-war "baby boom" will have past and the population will be somewhat older, household size will remain small and housing demand is projected to focus on small compact condominiums and cooperatives. Moreover, current social patterns do not indicate a slowing of the trend toward increasing household formation, thus continuing the consequent pressure on the existing supply of housing. At the same time, the growing trend toward two-worker households and projected new economic opportunities opening up in Boston in the next two decades will provide the necessary resources for the market for market-rate and luxury housing.

Although the housing program for the North Station project has not been specified, it is presently anticipated that this housing would be a mixture of types, primarily market-rate to luxury apartments and/or condominiums, but also including subsidized and/or elderly units as well. Under the preferred development program, 1,100 new units would be constructed, less than 0.5% of the current supply of housing in the City. While not a significant increase, these units nonetheless would help to expand the housing opportunities for the region's low- to upper-income households and thus would benefit these groups. The 300 units proposed in the optional program would also help to fulfill this growing demand, but to a much lesser extent. Based on projections for the next decade, and the current inventory of planned and proposed development of approximately 8,000 units, neither proposal, then, would be expected to adversely affect the City's housing supply.

Under the no-build alternative, the existing low-rental, and generally deteriorated, housing in the area would remain, but no new housing units would be expected to be built. On the contrary, trends would indicate that some of the existing units might be demolished over the years due to age and condition.

3.3 Public Services

Public services impacted by the proposed North Station redevelopment project include police and fire protection, schools, and health and cultural facilities (the impact on park and recreational facilities, public utilities, and public transportation services are discussed in previous sections of this Part).

The preferred development plan would add an estimated 1,820 residents and between 2,400 and 3,850 employees (depending on whether the hotel or the office development option is chosen for the existing Boston Garden site) to the North Station project area. Total average weekday population upon full development, including visitors and transients and assuming a full-capacity arena event, would be an estimated 47,865 to 49,495 persons (hotel vs. office development options).

Under the reduced-scale development proposal, resident population would increase by only 420 persons, but employee population would increase much more significantly, as compared to the preferred program, by between 4,820 and 6,270 persons (again depending on a hotel or office development in Phase I), and average weekday population would be somewhat higher - between 48,735 persons and 50,365 persons.

With the no-build option, the area's daily population would remain nearly the same as at present (assuming replacement of the DPW and Registry offices with an equal number of employees) and the existing demands on public services would not change to any significant degree (e.g, no school children would be expected to move into the area and require public schooling).

Police Protection

Development of the North Station area is not expected to result in an unusually high incidence of crime or to have a significant impact on police services. On the one hand, development would have a beneficial impact of removing the existing open, vacant, and generally unmonitored areas which are conducive to certain types of crime, but at the same time the opportunities for offenses such as shoplifting and robberies would naturally increase, and an increase in the number of police calls to the area could be expected. Total daily population in the project area would increase by between 13,700 and 16,200 persons (preferred vs. optional development programs), placing additional demands for police protection, but when compared with the current resident population of the Department's Area A (77,625 persons) or to the daily downtown population of an estimated 300,000 persons, the ratio of population to patrolmen would not increase significantly. However, the demand for future police services is not easily quantified, since crime analysis data suggest that there is no reliable correlation between population size or building type and crime levels.

The Federal Office Building will provide its own security force (Federal Protective Services), and private security guards and surveillance systems may be provided by the private developments as well; these measures would supplement the need for the City police force in the area and somewhat reduce the demands placed on them. Because of the growth in traffic in the area resulting from the development, additional personnel for traffic control may be needed at peak periods. Other factors contributing to the public safety in the area would include increased levels of lighting and additional nighttime activity in the form of new residential development.

Fire Protection

Although a substantial number of new buildings would be built in an area presently largely undeveloped, increasing the potential for a fire emergency, the impact of the proposed project on fire services is expected to be positive. Available evidence, both local and national, indicates that the incidence of fire is reduced substantially in new construction (although it is conceeded that the severity- potential may, in fact, increase). In accordance with the State Building Code and the Boston Fire Code, all new buildings must be of fireproof construction, have an adequate sprinkler system, and conform to all fire regulations. Furthermore, fire suppression would be aided by smoke detectors and control devices, centralized alarm systems, standpipe systems, and elevator safety devices. The result of such measures would lead to a reduction of fire probability and the demand for protection services over the existing, considerably older development on the site. Obviously, the less intense development of the reduced-scale program would result in a reduced demand for fire protection services as compared to the preferred development program.

The project area would be served by the Cambridge Street fire station, approximately 1/2 mile distant, which includes one ladder and one engine company, and the North End fire station (one ladder and one engine company) on Hanover Street, also half a mile away. A fireboat unit also is located at Battery Wharf in the North End and would be available to fight any shoreline fire in the project. In addition, mutual aid would be available from Cambridge should a major fire occur. A 16-inch high pressure fire service line, reserved exclusively for fire-fighting, is located on Causeway Street; an extension of this line into the project area may be necessary in order to provide adequate water pressure for fire fighting purposes.

Schools

The project area is located in Boston School District 7, which includes Charlestown, Central Boston, the Back Bay, and the South End and Lower Roxbury areas. This district currently contains 7 elementary schools, 2 middle schools, and 1 high school (Charlestown). Under the Federally-mandated Student Desegregation Plan, students from the project area would be assigned to one of the district schools on the basis of his or her residence and ethnic background. In addition, there is a City-wide school district offering magnet educational programs at each level to which a student could apply and be assigned, depending on space availability, the student's preference, and racial and other factors.

The number of school-aged children that could be expected from the residential section of the project is difficult to estimate at this time, since a housing program has not been established. However, considering the type and unit mix which probably would be developed (primarily market to luxury apartments and/or condominiums in the studio to two-bedroom range) and the anticipated characteristics of the future population (trends indicating a predominance of single persons and married couples without children), the project area probably would have a very small school-age population. Based on data for a similar type of residential development in the Lechmere Canal and Triangle area in Cambridge, (1) a factor of 0.05 student per unit was applied to North Station, resulting in 55 school-aged children for the preferred program and 15 for the reduced-scale program.

The public school system should have adequate capacity to handle this small number of children from the project area. Moreover, public school enrollments in Boston have been declining steadily in the past several years (although numerous schools have been, and are being, closed as a result of this decline in enrollments and budgeting restrictions). Some of the school-aged children also may attend private or parochial schools, further minimizing the possibility of the project creating an excess demand on the public school system.

Medical Services

Demand for medical services would increase with both build alternatives, but to a much lesser degree (in terms of the residential population) with the reduced-scale option. The impact, however, is not expected to be significant. The facilities of the Massachusetts General Hospital and the Eye and Ear Infirmary are less than one-half mile from the project area and would be available for any emergency, as well as general, medical occurrences. Under the reduced-scale option, the Massachusetts Rehabilitation Hospital would remain at its present location, but as this is a long-term, rehabilitative-type facility and not a general medical hospital, its relocation under the preferred plan would not adversely affect medical services for the project development.

Cultural Facilities

The proposed project is not expected to create any significant or excess demands on other public or cultural facilities, such as libraries, theaters, and museums; therefore, the adequacy of the existing facilities should not be exceeded.

4. Economic Impacts

4.1 Employment Opportunities

Construction Employment

Implementation of the North Station project would result in significant short-term construction employment opportunities, spread over the 15-20 years anticipated for completion of the various project elements. Total construction cost (excluding the Green Line relocation and the Storrow Drive Connector relocation) is very grossly estimated at $315 million (1980 dollars), of which Phase I development would cost approximately $160.5 million, or 51% of the total construction costs, and Phase II, $154.5 million.

Based on data supplied by the BRA Research Department,(2) it is assumed that construction payrolls would equal 45% to 60% of a building's construction costs, depending on its particular use, and that the average annual construction wage would equal $22,000, which would, of course, be split among many craftsmen each working for various periods of time. Therefore, it is estimated that the preferred development program would generate approximately 6,805 man-years of construction-related employment (3,476 man-years in Phase I and 3,329 man-years in Phase II).

For the reduced-scale development program, total construction costs are estimated to be $251.5 million, $160.5 million in Phase I and $91 million in Phase II. Consequently, there would be fewer construction jobs with this alternative. Total man-years of construction is estimated to be 5,429, of which 3,476 man-years (64%) would occur in Phase I and 1,953 man-years in Phase II.

With a hotel development in Phase I, rather than an office building on the Boston Garden site, construction employment would be reduced by approximately 93 man-years for each alternative.

Under no-build option, no new construction jobs would be generated in the project area.

Permanent Employment

Both build alternatives also would result in substantial permanent employment opportunities as well, with the reduced-scale option, because of its greater amount of office space, having the larger number of total employment (Table VI.L-3).

Table VI.L-3

Employment by Alternative

Alternative	Office	Retail/ Commercial	Service/ Other	Total
Existing/No-build	930[1]	134	896	1,960
Preferred Program[2]				
(a) Office option	4,800	455	560	5,815
(b) Hotel option	3,000	455	910	4,365
Optional Program[2]				
(a) Office option	7,005	330	895	8,230
(b) Hotel option	5,205	330	1,245	6,780

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[1] Assumes replacement of DPW/Registry employees by a similar number of public or private employees.

[2] Office/hotel options refer to reuse of the Boston Garden development site.

Under the preferred program, the majority of the jobs would be located in the Phase I area - 5,160 jobs (89%) with the office development option or 3,730 jobs (85%) with the hotel option. With the reduced-scale alternative, however, a larger number of jobs would occur in the Phase II area. Employment in Phase I would be the same as the preferred program but would equal 63% of the total jobs under the office option and only 55% under the hotel option.

Retail employment would be expected to increase by about 320 jobs over the current level under the preferred program and by about 195 jobs with the reduced-scale option. The major growth in jobs, however, would occur in the office sector, and nearly all of the jobs would be new to the project area, since the State offices are expected to be relocated to the new State Transportation Building by early 1984. At the same time, not all of the jobs would necessarily be new to the City of Boston. The GSA has estimated that approximately 90% of its projected 3,000 employees in the new Federal Office Building are already employed within the Boston CBD. In addition, according to BRA analysis, it is estimated that approximately 22% of employees in the new private office space would be relocating from existing space within the City, the remaining 78% being jobs new to Boston.

Service and other jobs would be primarily those related to hotel development and the Arena, the latter already existing in the project area. In the optional program, service jobs also include those of the Rehabilitation Hospital, which would remain under this alternative.

With the no-build option, no new permanent employment opportunities would be created, since reuse of the Registry Building would essentially replace the existing jobs located there. As the types of businesses in the area would not be expected to change significantly without a project, this area's employment would not be likely to change from the current level.

4.2 Retail Activity

Total retail space proposed for the project area is 215,00 square feet under the preferred program and 150,000 square feet under the reduced-scale program, of which 125,000 square feet (in either program) would be located in the Phase I area. This represents an increase of 173,570/83,570 square feet over the existing retail space in the area and approximately 3.9%/2.3% of the total retail space in the Boston CBD.

This is a relatively small amount of retail space and thus it is not expected to have any major impact on existing retail space in the downtown area. On the contrary, much of the new space would actually serve the shopping demands of the expanded residential, employee, and transient population of the project area resulting from the proposed development. In addition, several of the existing retail firms in the area, especially those related directly or indirectly to the Boston Garden and the commuter rail station (such as the sports and souvenier shops and the restaurant/lounges), would be expected to remain in the area, relocating within the new facilities. At the same time, however, most of the existing small, marginal firms (used furniture, wholesale/storage) requiring low-rent space, would not be able to afford the rent levels required by the new development and thus would require relocation outside the project area.

No new retail space would be expected to be developed in the project area under the no-build alternative. Existing space would remain virtually the same, with vacancies occurring now and then.

4.3 Office Activity

Under the preferred development plan, 1,200,000 gross square feet of office space, including 800,000 square feet for the new Federal Office Building, is planned, all of which would be located in the Phase I development area. The remaining 400,000 square feet would be a private office structure on the site of the present Boston Garden/North Station building. However, if the hotel option is chosen for this site, office activity would consist only of the GSA building. A substantially greater amount of office space would be developed under the optional, reduced-scale, plan. Phase I office development would remain the same (with the same hotel option), and additional office space would be provided in the Phase II area - 250,000 gross square feet of new construction (replacing the hotel of the preferred plan) and 240,000 gross square feet from rehabilitation of the Registry Building. All of this space is projected as private office space, although reuse of the Registry Building by the Commonwealth for one or more State agencies would be possible if the need arose.

At the present time, Boston is experiencing a shortfall in office space supply. Within the Downtown area (excluding the Back Bay) there are approximately 31.1 million gross square feet of competitive (private) office space. Class A space* currently accounts for an estimated 43.5% of the total downtown office space, with 13.5 million gross square feet. Class B consists of 6.9 million square feet, or 22.2% of the total, while the remaining 10.7 million square feet (34.3%) falls into Classes C and D. According to office industry surveys, vacancy rates have steadily declined in recent years, despite the construction of over 17 million square feet of competitive office space since 1960. As of the Spring of 1983, the Downtown vacancy rate was 6.4%, with Class A vacancy at a very low 1.9%, indicating that the City has virtually run out of prime office space.**(3)

Expansion of Boston's office industry, particularly the growing service industry sector, is anticipated to continue strong through the 1980's. According to BRA Research Department studies, a market potential (absorption) of 1 million square feet of additional office space per year may be projected for the 1980-1990 decade, to fulfill the demand created by new firms, replacement of obsolete space, and vacancy allowances. Currently, over 3.2 million square feet of new private office space are under construction in the Downtown and is expected to be on the market by 1984, but only another 2 million square feet of new space currently are in the planning stages for 1990. Thus the office space market can be expected to remain very tight in downtown Boston over the next several years, with a continuing deficit of available space.

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* Class A space is that built since 1958 or rehabilitated old space; Class B space is pre-1960, but excellently maintained; Classes C and D are pre-1960 with no renovation and marginal repair and maintenance.

** A minimum vacancy rate, which allows the market to operate normally, is generally thought to be between 3% and 5%.

Under these conditions, then, the proposed private office space in the North Station area could easily absorb the excess demand potential without adversely impacting the current inventory. Depending on the build alternative, the North Station project would fulfill only between 4.0% and 8.9% of the projected 10-year demand for new competitive office space.

With respect to the proposed Federal Office Building, the GSA has determined that of the 483,000 square feet of tenancy presently scheduled to be relocated into the new facility, 124,000 square feet is government-owned, 323,000 square feet is located downtown, and 36,000 square feet is leased within the suburban area. Given the shortage of high quality office space in the downtown area (a situation which similarly exists in the suburban area), the GSA has concluded that this space should be absorbed within less than a year.(4)

Under the no-build alternative, no new office space would be added to the project area, although the Registry Building would be available by 1984 for rehabilitation into private office space if not required by the Commonwealth for State office use.

4.4 Hotel Activity

Until recently, Boston similarly had a critical shortage of hotel facilities to accommodate the increasing numbers of convention delegates, business visitors, and tourists travelling to the City. However, this shortage has somewhat declined in the past year. The average occupancy rate for Boston's hotels in 1982 was 68.4%, down 11.6% from the 1979 high of 77.4%. According to a 1979 BRA study, the City then had a hotel deficit of 1,830 rooms, with an additional estimated 1,125 rooms considered obsolete and requiring replacement.(5)

Business visitors constitute 49% of hotel room sales in Boston, and increased business visitor demand, based on downtown employment projections, is expected to require 3,340 new hotel rooms by 1990. Convention business (31% of hotel room sales) is projected to grow by 190% (if the City's convention facilities are expanded, as proposed) and will require 4,000 new rooms by 1990. Rooms for tourists constitute the remaining 20% of the current market. Based on national travel projections and the prognosis for tourism in Boston, which is expected to double by 1990, an additional 2,740 new hotel rooms would be required to satisfy this demand. In total, the BRA projected a need for some 11,205 new hotel rooms by 1990. (Should the City's convention facilities not be expanded, total hotel room demand would be reduced by an estimated 3,000 rooms.)(5)

Since 1981, 2,136 new hotel rooms have opened up in Boston, giving the City a total of 9,061 rooms. Currently three new hotels with a total capacity of 1,934 rooms are under construction; when completed by 1984, Boston's inventory of hotel rooms will have jumped by 59%

to nearly 10,995 rooms. An additional 3,280 rooms (excluding North Station) have been proposed for the City by 1990, fulfilling, in total, approximately 79% of the 1990 demand. However, with the recent declining occupancy rates, there has been some concern expressed of a potential oversupply of hotel rooms in the next few years, at least until the City's convention facilities are expanded and improved.

The 400-room hotel proposed for Phase II of the North Station project could fulfill part of the projected demand, particularly if some of the other current proposals are not implemented. However, since this hotel would not be ready for development until late in the decade, at the earliest, its impact would depend primarily on conditions existing at that time. Under the present situation, the optional reuse of the Boston Garden site in Phase I for hotel development (350 rooms) probably would not be warranted. The reduced-scale program does not include a hotel in the Phase II development area.

No new hotel space would be built under the no-build alternative. At the same time, it is unlikely that the now-vacant Madison Hotel could be economically rehabilitated for hotel reuse.

M. Secondary Impacts

Secondary impacts of the proposed North Station redevelopment project primarily relate both to development pressures on adjacent districts and to socio-economic effects on neighboring areas and the City as a whole.

The major potential development impact of the revitalization of the North Station area and the removal of the Green Line elevated structure would be the stimulation for the renovation and extensive improvement of the Bulfinch Triangle district. Today an underutilized wholesale/commercial area, the strength of the Triangle lies in its architectural character and its regular street and building pattern which give the area a distinct quality. Each of the local streets has a separate identity making for a unique experience within the overall district area. The negative influences of the Green Line elevated, the Central Artery, and the MBTA tunnel along Canal Street, and continual traffic congestion around and within the Triangle, however, have effectively inhibited the feasibility of upgrading this area.

Notwithstanding these conditions, some renovations to offices and artist's lofts have begun recently, and the City recently completed the construction of a pedestrian-oriented mall along Canal Street linking North Station to Government Center. Implementation of the North Station project proposals, especially the Phase I construction, could be expected to reverse the past pattern of stagnation and decline and to encourage further improvements to the Bulfinch Triangle area and an enhancement of the district's physical quality through rehabilitation and infill construction that would fit the existing fabric. With this upgrading, however, property values and rentals could be expected to rise which, while beneficial from the standpoint of City tax revenues, could adversely impact many of the present businesses and occupants in the area who are only able to afford the low rent levels which the district currently offers.

Similar pressures could be expected on the nearby North End residential community. As new or rehabilitated office and commercial facilities are developed in the North Station project area and in the Bulfinch Triangle, the North End may be viewed as an attractive and convenient intown residential neighborhood, resulting in the conversion of existing properties to high-rental apartments or condominiums. Already, this phenomenon is developing in the North End, particularly near the Waterfront development. The result of this pressure would be a further intensification of a growing change in the socio-economic character of the traditionally low-rent Italian-dominated North End community. With conversions and increasing housing costs, many of the residents, especially the elderly and those on fixed-incomes, may be forced to relocate outside of their life-long neighborhood. The new housing proposed for the North Station project area could relieve some of the pressures, but the timetable for its development may be too late to be effective. Only a strong City policy toward housing conversion in low-income areas could effectively control the pressures of the private marketplace. In this regard, it should be noted that new construction and rehabilitation in the North End have included a number of subsidized units which have been made available to local residents.

Secondary socio-economic impacts include the aforementioned consequences of development pressures on adjacent neighborhoods (increased property values and rents, displacement potential, and the subsequent alterations in existing community character and cohesion) as well as significant economic benefits to the City as a whole from the new employment opportunities, retail sales, and hotel occupancy created by the project components. These benefits have been described in detail in the Socio-Economic Impact section above.

The secondary impacts of the reduced-scale development program would be basically similar to the preferred program. However, since substantially less housing would be provided under this option, its mitigative effects on potential conversions in the North End would not be as significant.

The no-build alternative would not produce any of the development pressures or changes in community character of the two alternate development programs on adjacent districts. On the other hand, maintenance of the existing blighting influences of the North Station area would not be expected to encourage the revitalization of the Bulfinch Triangle district.

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Part VII - ENVIRONMENTAL IMPACT SUMMARY

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A. Summary of Environmental Impacts and Benefits

1. Short-Term Effects

1.1 Land Use and Development

Development options: For the preferred development plan, short-term land use impacts would involve primarily the displacement of all existing uses (the Boston Garden and commuter rail functions would continue until a new facility were constructed) and the demolition of all buildings and clearance of the land accompanying these displacements. Under the optional (reduced-scale) development program, the Massachusetts Rehabilitation Hospital and the DPW/Registry Building would remain but all other structures and land uses would be cleared for new development (as in the preferred option).

No-Build: No clearance of existing uses would occur, although some buildings might be vacated under normal market conditions and be cleared for additional surface parking.

1.2 Open Space and Recreation Areas

Development options: Since no public open space or recreational areas (other than the Charles River Basin) presently exist in the project area, neither redevelopment proposal would affect any of these resources.

No-Build: There likewise would be no impact.

1.3 Charles River Usage

Development options: Construction of the mid-river island could temporarily disrupt the passage of pleasure craft and commercial boats on the portion of the Charles River Basin between the two dams, as could any highway construction in connection with the proposed Leverett Circle/Central Artery Connector relocation.

No-Build: No short-term impacts on the use of the river would occur.

1.4 Traffic, Circulation, and Transportation

Development options: Some traffic congestion, increased travel times and distances, and delays would occur during the construction period, owing to detours, reroutings, street narrowings and closings, and construction-related traffic. On-street parking (if allowed) and construction loading and unloading would exacerbate this situation. Traffic service disruption would be greatest during the reconstruction of Causeway Street and removal of the Green Line elevated structure. Similarly, transit service in the area would be interrupted, from a weekend to as much as a six-month period (depending on the alternative), due to improvements to or relocation of the Green Line. Pedestrian access to public transportation and existing development would be hampered for short periods. Construction activity also would result in the temporary loss of existing parking spaces, forcing a displacement to nearby facilities.

No-Build: Existing traffic circulation patterns and problems would continue as at present, with no improvements. Disruption and delays resulting from construction activities, however, would not occur. The Green Line elevated structure would be retained in place, and no improvements would be undertaken, except for minor refurbishing and structural maintenance.

1.5 Public and Private Utilities and Services

Development options: Most existing public and private utility and communication lines within the project area would be displaced to accommodate the redevelopment proposals (either build option). However, the major Combined Sewer Overflow in the lower portion of Nashua Street will be retained in place and be incorporated into the design of the GSA Building. All other lines would be abandoned or relocated to the periphery of the project area, and new infrastructure would be constructed to serve the new development. The existing Boston Edison steam booster plant also would be displaced. Construction of the project improvements could cause temporary disruption to traffic movement, detours, inconveniences, and delays and could also make the provision of other services to the area, such as police and fire protection, more difficult. These impacts would disappear once construction was completed. An estimated 182,000 cubic yards of demolition debris would be generated by full implementation of the preferred plan, and 137,000 cubic yards by the reduced-scale project.

No-Build: No disruption of existing utilities and services would occur. Normal maintenance of these facilities would continue but no new utility construction would be anticipated. No demolition wastes would be produced, unless private demolitions were to occur.

1.6 Soils, Geology, and Topography

Development options: Unsuitable bearing soils (i.e., fill and organic and marine deposits) would be removed for some structural foundations, piles driven to bedrock or caissons probably would be required, and some minor alterations to the present flat topography would be made during construction. A temporary lowering of the water table also could occur, requiring recharging in order to ensure maintenance of groundwater levels. Ground vibration resulting from pile driving could cause some damage to nearby buildings. The major land-form change would result from the dredging of the canal and construction of the mid-river island in Sub-area II. Approximately 270,000-320,000 cubic yards of soil would require excavation under the preferred program, and 215,000-265,000 cubic yards under the optional scheme, with an additional 260,000 cubic yards if the Green Line subway and Leverett Circle/Central Artery tunnel proposals are implemented.

No-Build: The no-build alternative would simply involve the maintenance of the status quo and would have no effect on soils, groundwater, and geologic conditions.

1.7 Water Quality

Development options: During the construction period, water quality could be adversely impacted from soil erosion, resulting in increased turbidity and sedimentation in the Charles River, and from an increase in suspended solids, oils, grease, and chemicals from surface runoff and stormwater discharges, unless proper mitigation measures were implemented. Short-term adverse impacts particularly would result from construction of the canal and island in Phase II of the project and from the tunnel option for the Leverett Circle/Central Artery Connector relocation.

No-Build: No additional degradation of water quality or contamination would result from the no-build alternative.

1.8 Hydrology and Flood Control

Development options: Construction of the canal and mid-river island could have significant impacts on stream flow and other hydrological characteristics of the Lower Charles River Basin. These will be subject to more detailed investigations when Phase II of the project is more fully developed. There would be no short-term impacts on flood-control measures.

No-Build: This alternative would not affect the hydrological characteristics of the Basin between the two dams nor existing flood-control efforts.

1.9 Vegetation and Wildlife

Development options: Due to the absence of significant vegetation and wildlife population in the project area, short-term negative effects would be minimal. Existing vegetation would be removed to accommodate redevelopment. Dredging and filling in the Charles River for Phase II of the project would significantly disrupt aquatic life and oganisms, but this impact would be temporary and species would be replaced within a few years.

No-Build: Under the no-build option, the existing man-made landscaping and natural weed growth in the project area would not be disturbed, and there would be no disruption of wildlife or wildlife habitat or of the aquatic biological species.

1.10 Air Quality

Development options: Some deterioration of air quality would occur during the construction period of the project. The most significant impact would be substantial increases in particulate levels as a result of building demolitions, excavations, and site preparation activities, but these emissions could be mimimized through the application of dust-control measures. Construction equipment and trucks also would release small amounts of air pollutants. In addition, air quality could be affected by traffic congestions or slow-downs due to detours. All of these effects would be of short duration and would be restricted to periods of active construction.

No-Build: Since no construction activities would occur, ambient air quality would not be impacted. Vehicular emissions would decline over time, even though traffic volumes in the area would increase slightly from normal growth rates.

1.11 Noise Levels

Development options: Increased noise levels inevitably would result from operation of the construction machinery and equipment and construction trucks, but these are not expected to be excessively disturbing except for pile-driving operations. Most construction would take place away from noise-sensitive residential uses. Construction noise can be reduced by the installation of noise-abatement equipment and by compliance with applicable City and State noise control regulations.

No-Build: Noise levels would not increase to any noticeable extent.

1.12 Energy

Development options: Considerable energy would be required for building demolitions, site preparation, excavations, and construction activities. The reduced-scale program overall would utilize approximately 25% less energy than the preferred development program, but this advantage would be considerably reduced on an average basis.

No-Build: Additional energy consumption would be required only if an existing building were demolished or rehabilitated.

1.13 Urban Quality and Design/Visual Characteristics

Development options: Clearance of the existing buildings and the resulting vacant parcels might present a blighted, barren landscape and negatively affect the local environment for short periods of time. Extensive land preparation and construction activities could have either adverse or visually exciting impacts, depending on the observer's perception.

No-Build: The existing blighting conditions and unattractive characteristics of the area, particularly the Green Line elevated structure and the deteriorated buildings and incompatable uses in the Billerica Street blocks, would continue to exist and negatively affect the project area and environs.

1.14 Historical and Archaeological Resources

Development options: Redevelopment activities would not affect any property of historic or archaeological significance. Construction activity and increased construction-period traffic or congestion in the Bulfinch Triangle area could temporarly affect this historic district.

No-Build: No short-term impacts would occur.

1.15 Community Character and Cohesion

Development options: Existing community cohesion would be disrupted by the displacement required to implement the project. Nearly all existing uses would be removed and replaced with new uses of both similar and significantly different character. The Massachusetts Rehabilitation Hospital would be retained in the optional program.

No-Build: There would be no change in the existing commercial and low-income residential character of the community.

1.16 Displacement and Relocation

Development options: Both alternative development programs would require the relocation of the existing 68 households in the project area. All 49 businesses would be displaced under the preferred program (the DPW and Registry offices plan to move to new offices independent of the project), but the Rehabilitation Hospital would remain under the reduced-scale development plan. Some existing businesses, including the commuter rail facilities, the Garden and associated businesses, would return to new quarters.

No-Build: No displacement or relocation would occur.

1.17 Housing Supply

Development options: The existing supply of low-rental, substandard housing would be acquired and demolished under either development option.

No-Build: The existing housing would remain as a resource for low-income households.

1.18 Economic Activity

Development options: Displacement required to implement the redevelopment of the project area would have temporary negative impacts on project area business activities, employment, and tax resources. Businesses in adjacent areas also might be adversely impacted by the disruptive effects of construction activity, traffic congestion and detours, and difficulties in pedestrian access. Full development of the project would generate 5,429 to 6,805 man-years of construction-related employment over a 15-20 year period, for the optional and the preferred development programs respectively.

No-Build: No disruption of economic activity would occur, and no new construction jobs would be created in the project area.

1.19 Secondary Impacts

Development options: Temporary negative impacts could occur in the immediately-adjacent areas due to construction-related activities, including disruption to vehicular and pedestrian circulation, increased construction traffic, detours and traffic congestion, increased levels of construction-generated noise and particulate emissions, and elimination of on-street parking.

No-Build: No short-term secondary impacts would occur.

2. Long-Term Effects

2.1 Land Use and Development

Development options: Planned land uses within the project area, under either redevelopment alternative, would occur in both the public and the private sectors and would continue the prevalent downtown Boston mix of urban uses as well as the existing character of the project area, albeit, in some cases, in substantially different locations or in a much different form. Sigificantly more intense utilization of the available land area would occur, consistent with the redevelopment goals of the City. Changes would include new roadways and pedestrian circulation systems, improved public transportation facilities, riverfront open space, and a new Federal Office Building and new sports arena on the public side, and new residential, commercial, hotel, and office uses on the private side. These proposals constitute the Renewal Plan's aim to upgrade and enhance this presently underutilized section of Central Boston. Relocation of the Green Line would facilitate the redevelopment proposals, but preliminary plans for relocating the Leverett Circle/Central Artery Connector or depressing the Central Artery would severely conflict with Phase II land use proposals and reduce their development potential.

No-Build: Under the no-build option, land uses would remain essentially the same as at present and no new development could be reasonably foreseen in the near-term future. Existing adverse conditions in the project area would continue to deter revitalization efforts.

2.2 Open Space and Recreation Areas/Public Access

Development options: In the long-term, project area open space would be both increased in area and enhanced by the build alternatives. At full development, 7.3 acres and 10.2 acres of park area and open space would be provided by the preferred and the optional development programs respectively. Improved access to and through these areas for pedestrians, bicyclists, and project area users would increase the potential for their use. For the first time, the riverfront in this area would be open to public access and enjoyment by the extension of the Esplanade Park system and pedestrian promenade.

However, bridge options for the Leverett Circle/Central Artery Connector relocaton, as well as the Central Artery depression proposal, would severely affect the parkland potential of the river's edge.

No-Build: Under the no-action option the riverfront would remain in its current unkempt state and would continue to be generally inaccessible to the public.

2.3 Charles River Usage

Development options: The design of the mid-river island would take into consideration the need for an adequate navigational channel for the passage of both pleasure and commercial boats. The bridge options for the Leverett Circle/Central Artery Connector relocation, on the other hand, could limit or obstruct this channel.

No-Build: Existing conditions would be maintained.

2.4 Traffic, Circulation, and Transportation

Development options: Nearly all existing streets within the project area, with the exception of the peripheral roadways, would be discontinued and a new internal circulation system to serve the proposed redevelopment would be provided. In the longer-term, the Preferred Alternative is expected to generate 4,400 additional auto trips per day, and the Optional Alternative 3,500 additional auto trips, by the year 2000. In the P.M. peak-hour, approach volumes at major intersections in and around the project area would increase over existing volumes by 12% to 185% and by 10% to 164% for the Preferred and Optional Alternatives respectively (volumes at Martha Road and Lomasney Way would increase over eight-fold to seven-fold, respectively, because of traffic relocation due to the discontinuance of Nashua Street). Levels of service at these intersections would remain the same at two locations but would be degraded at seven locations. The existing 2,330 parking spaces would be replaced by 3,700 and 3,000 off-street spaces under the two build alternatives, and these would be adequate to handle project-generated demands (except for arena events, for which demand would exceed capacity). Improved pedestrian and bikeway connections would be provided under both build alternatives. As a result of new transit facilities and the proposed development, future (Year 2000) Green Line ridership would increase significantly by approximately 4,700 person-trips (boardings) and 4,300 person trips, respectively, for the Preferred Alternative and the Optional Alternative. Overall, transit (including commuter rail) usage would be expected to represent approximately 40% to 46% of all project area-generated person trips. Implementation of the DPW-proposed Leverett Circle/Storrow Drive Connector relocation could result in additional traffic on local streets, depending on the alternative chosen. Implementation of the Central Artery depression proposal would significantly reduce traffic volumes at Keany Square and on Causeway Street but could increase it at other locations, including Leverett Circle.

No-Build: Under no-build conditions, no traffic or street improvements would be made in the project area. Background traffic would be expected to grow at an annual rate of 0.5%. P.M. peak-hour approach volumes at major intersections would increase, by the year 2000, by between 8% and 33%, resulting in a reduction of level of service at five intersections. Parking facilities would be expected to remain the same in number as currently exist, and there would be no improvments to pedestrian or bicycle circulation. The MBTA Green Line elevated structure would be retained in place, and ridership would be expected to increase by only 1,100-1,200 persons by the year 2000.

2.5 Public and Private Utilities and Services

Development options: Full development of the renewal project would increase demands on public and private utility systems (water, sewerage, gas, communications, etc.) and services (fire, police, educational, health, etc.), but these impacts would not be particularly significant. Average daily water consumption would be approximately 838,160 gallons and 742,700 gallons, respectively, for the Preferred and the Reduced-Scale Alternatives and could be accommodated adequately by the municipal system, although additional pressures would be placed on the adequacy of the MDC supply. Wastewater flows in 2000 are estimated to be 754,345 gallons per day and 668,430 gallons per day, respectively, for the Preferred Alternative and the Optional Alternative. Storm drainage runoff should be less than present flows since the unpaved open space area of the project would be increased. Both the municipal and the MDC sewer and storm drainage systems would be adequate to accommodate the additional project area loads. Private utilities, such as electricity, gas, and telephone, also would be able to satisfy the demands of the proposed development under either build alternative. No significant long-term adverse impacts on the City's emergency, educational, or cultural facilities and services would be expected to occur from either build option. Such servces actually should be enhanced because of improved roadway access, 24-hour project area activity, new security measures, increased levels of lighting, and building compliance with modern safety and fire codes. An estimated 55 school-aged children would be added to Boston's school system at full development under the preferred program and only 15 children with the reduced-scale option. Approximately 23-24 tons of solid waste per day would be generated by the project and would be removed from the site for disposal by both municipal and private services.

No-Build: Under the no-build option, there would be no additional demands on public or private utilities and services, and consumption and generation rates would be expected to remain more or less equal to current demands. The existing conditions and character of the project area would continue to require greater safety and emergency services, but no school-aged children would be expected to move into the area.

2.6 Soils, Geology, and Topography

Development options: Physiographical impacts would occur primarily in the short-term construction period; long-term affects would involve the permanent maintenance of alterations which would have occurred during construction of the project (e.g., minor topographic changes, modification of the Charles River shoreline by construction of the canal and mid-river island).

No-Build: Topographic and geologic conditions would not have been altered but would remain essentially the same as at present.

2.7 Water Quality

Development options: The water quality of the Lower Charles River Basin is expected to improve progressively over the next several years primarily as a result of recent MDC pollution abatement and CSO improvements and the operation of the new Charles River Dam, projects which are independent of any North Station area development. Decreased surface runoff because of increased project area open space and landscaping also should help improve the quality of the river.

No-Build: The no-build alternative would have minimal impacts on water quality, principally continuation of the existing degradation from contaminated surface runoff from shoreline parking lots.

2.8 Hydrology and Flood Control

Development options: Permanent changes in the hydrology of the Basin between the two dams probably would result from the construction of the mid-river island; the specific impacts, however, would not be determined until detailed studies are undertaken at a later stage of the project design. Future bridge construction in the Basin to replace the existing Leverett Circle/Central Artery connection or for new Central Artery bridges also could permanently affect hydraulics. Neither build alternatives would affect the flood control characteristics of the new Charles River Dam.

No-Build: No changes to the hydrology of the Basin or the flood control operations of the new dam would occur.

2.9 Vegetation and Wildlife

Development options: The provision of additional open space and landscaping in the project area where little presently exists, under both build alternatives, should enhance the biological environment and provide new habitats for bird species and small wildlife. Urban vegetation in the area would be significantly increased. Improvements in water quality also should encourage increases in aquatic life and species.

No Build: No improvement in the area's biological resources would occur. Existing weed species would continue to dominate. Improvements in aquatic life would still result because of the MDC projects independent of the North Station redevelopment, but continuation of contaminated surface runoff could have persisting adverse impacts.

2.10 Air Quality

Development options: No violations of either the 1-hour or 8-hour CO standard are predicted for any of the development options in future years, except for one receptor location at Keany Square in 1987 (8-hour). Over the long term, air quality in the project area actually would improve over existing conditions because of stricter Federal and State emission controls on automobiles and compliance with the Boston Transportation Control Plan, even though vehicle-miles travelled would increase. By the year 2000, total emission burdens would be considerably less than existing for both build alternatives; on a daily basis, total CO emissions in the project area and immediate environs would be reduced by approximately 49% and 53%, total NO_x emissions by 29% and 32%, and total NMHC emissions by 68% and 70%, for the Preferred Alternative and the Optional Alternative respectively. However, the total emission burdens would be 4% to 24% higher than for the No-build alternative. The covering of the commuter rail trucks could result in the venting of unacceptable levels of nitrogen dioxide, considerably exceeding proposed short-term standards. None of the Green Line relocation options would have any perceptable impact on ambient air quality.

No-Build: Even with the projected normal annual growth of background traffic in the project area, future emission levels would be reduced significantly in the future due to the emission control program and implementation of an I/M program. By 2000 total daily CO emissions from North Station and the immediate vicinity would be reduced about 59% from existing levels, total NO_x by 35%, and total NMHC by 73%. The commuter rail tracks would remain uncovered.

2.11 Noise Levels

Development options: Future day-night sound levels are projected to be within 1 dB of existing levels, except at one location (site of the Massachusetts Rehabilitation Hospital) where Year 2000 levels would be significantly lower than both exising and no-build levels. With this one exception, the changes would be inperceptable to human hearing. Overall, however, ambient levels would contine to be high, exceeding HUD acceptability criteria for housing and residentially-related sites, thus requiring the design of adequate noise insulation into proposed residential buildings. The Green Line contribution, regardless of relocation alternative, would be minimal, although squeal noise at tight curves would be disrupting. Noise levels could be reduced at some receptors by constructing noise barriers along expressway segments and by incorporating sound attenuation measures into the reconstructed Green Line structure. Noise from building mechanical systems should not be a particular problem, since they can be designed and controlled to meet applicable noise level criteria. Implementation of any of the bridge options for the proposed DPW Leverett Circle improvements could noticeably increase ambient levels, whereas the tunnel option would have minimal impact except within the tunnels themselves. The lower-level bridges of the Central Artery depression proposal also would increase ambient levels.

No-Build: Background traffic is estimated to grow at an annual rate of 0.5%, but this increase would not be large enough to affect ambient noise levels. Roadway noise would increase by only 1 dB or less by 2000, but the commuter rail noise contribution is expected to decline because of reduction in nighttime operations.

2.12 Energy

Development options: Energy consumption (at the building wall) would equal 5.007×10^{11} BTU/yr. and 4.131×10^{11} BTU/yr. for the preferred option and the reduced-scale option respectively. Energy required at the source would depend on the specific energy scenario selected for the project and would vary from 5.908×10^{11} BTU/yr. to 1.589×10^{12} BTU/yr. for the preferred plan and from 4.870×10^{11} BTU/yr. to 1.307×10^{12} BTU/yr. for the reduced-scale plan. Related air pollution emissions similarly would be dependant upon the specific energy sources and scenarios. No exisitng buildings would be conserved and reused with the preferred program, but two major structures would be retained under the reduced-scale option.

No-Build: Energy sources and consumption would not be expected to change from current usage. This alternative would offer the maximum opportunity for the reuse of existing buildings, although rehabilitation potential would be limited.

2.13 Urban Quality and Design/Visual Characteristics

Development options: Significant long-term aesthetic and visual improvements within the project area should result from implementation of either build alternative. The existing unsightly open parking areas, railyards, and deteriorated buildings would be replaced by a defined urban fabric combined with attractive parkland and pedestrian amenities. The benefits of these improvements would accrue not only to project area residents, workers, shoppers, and visitors but also to the Boston and other surrounding communities. Design controls on height, scale, massing, and building materials, and the provision of open space, linkages, and a mix of urban and natural elements should ensure both visual and aesthetic improvements over existing characteristics and compatibility with the environs. The Central Artery depression proposal and the bridge options for the Leverett Circle/Central Artery Connector relocation, however, would have significant adverse impacts on the aesthetic environment of the Charles River edge of the project.

No-Build: No significant investment in the project area would be expected in the long-term to improve the visual and design qualities of the area. Some selected rehabilitation could occur (*e.g.*, the Boston Garden) but the predominance of open parking lots and an overall unattractive image could be expected to continue. Existing undesirable views would remain unchanged, and the Green Line elevated structure would continue to blight adjacent properties.

2.14 Historical and Archaeological Resources

Development options: Development of the project should enhance the opportunity and feasibility of renovating the architectually significant buildings in the adjacent Bulfinch Triangle area. No long-term adverse impacts on historical or archaeologcal resources are anticipated.

No-Build: Maintenance of the existing Green Line elevated would continue to blight the historic Bulfinch Triangle area.

2.15 Wind and Shadow

Development options: Potential wind channeling and vortex formation could occur as a result of building design and placement. However, excessive pedestrian-level wind speeds due to tall buildings are not anticipated since maximum building height permitted would be 200 feet. Adverse shadow effects on public spaces during much of the year could occur if building heights are not restricted or setbacks provided.

No-Build: There would be no change in existing wind and shadow conditions.

2.16 Community Character and Cohesion

Development options: Complete redevelopment of the project area, even under the reduced-scale alternative, would establish a new community identity and character. Most significantly, the characteristics of the resident population would change dramatically from a low- to moderate-income, primarily elderly, population to residents generally of high income, small household size, primarily professional occupations, and high mobility. The total project area population would increase by over 18 times with the preferred development program and 5 times with the optional program.

No-Build: Under the no-build option, little or no change would be expected in the existing cohesiveness or character of the project area.

2.17 Housing Demand and Supply

Development options: Under the preferred program, 1,100 units of mixed housing (including subsidized, market, and luxury apartments and/or condominiums) would be provided, and under the reduced-scale program, 300 units. These units would help fulfill the growing need for housing in Boston, which exists at all income levels.

No-Build: The existing low-rental housing in the area would remain, but no new units would be built.

2.18 Economic Activity

Development options: The long-term economic impact of both build alternatives generally would be positive and would include increased employment, business and hotel sales volumes, and City and State tax revenues. These impacts would be felt both locally and within the entire Boston region. For the preferred development 4,365-5,815 permanent jobs would be created depending on whether a hotel or an office building were developed in Phase I (approximately 3,000 of these jobs, however, would be Federal workers relocating from elsewhere in the city and region to the new Federal Office Building). With the reduced-scale program, because of the greater amount of office space provided, 6,780-8,230 jobs would be created. The office proposals would help reduce the current deficit of prime office space in downtown Boston, but the additional hotel rooms might encounter a temporary oversupply in the near-term future unless the City's convention facilities are expanded.

No-Build: No new retail, office, or hotel space would be constructed and no new employment opportunities would be created. The economic activity of the area would remain essentially as at present. The Massachusetts DPW and Registry offices would vacate (independent of the project) but could be replaced by new public or private offices.

2.19 Secondary Impacts

Development options: Redevelopment of the North Station area and removal of the Green Line elevated structure from Causeway Street could be expected to stimulate the rejuvenation and extensive renovation of the adjacent Bulfinch Triangle district. With this upgrading, property values would be expected to rise which, however, could adversely impact many of the present businesses which can only afford the current low rentals. Similar development pressures, particularly the conversion of existing low-rental housing to high-rent apartments or condominiums, could negatively affect the nearby North End neighborhood.

No-Build: The no-build option would not produce any of the development pressures on, or changes in character of, adjacent districts that would result from the development alternatives. Continuation of the blighting influences of the North Station area would not be expected to encourage the revitalization of the Bulfinch Triangle area.

B. Relationship between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

National environmental policy, as expressed in the National Environmental Policy Act of 1969, describes each generation as a trustee of the environment for succeeding generations and, as such, having the responsibility to weigh all factors which would tend to narrow the options for future beneficial uses of the environment or pose long-range risks to public health and welfare. In the context of this project, "short-term" is defined as the time span of the construction period of the North Station redevelopment project while the "long-term" refers to that period of time in which all significant consequences of the proposed project would be felt. The extent of trade-offs between short-term environmental gains at the expense of long-term productivity, and vice versa, comprise the short-term/long-term relationships described below.

The project area today is the last remaining undeveloped and underutilized section of the central area of Boston. The current uses are older urban, but the presence of adverse environmental factors, such as the Green Line elevated, has seriously restricted its improvement and renewal. The principal aims of the proposed project, thus, are to revitalize this valuable area and to recapture the riverfront for more intense public use, resulting in the long-term enhancement of the urban environment.

The relationship between the short-term and long-term uses of the project area's environment involves the commitment of the project area to permanent, primarily new, urban uses, including private residential development, offices and commercial outlets, a hotel, a new sports arena, supporting parking and transportation facilities, and public open space. The short-term uses are the construction phase of development, following which the establishment and operation of the urban elements are the long-term uses. However, the construction phases will not occur uniformily over the project's development but will be spread out over a 15-20 year period. Thus, at any particular point in time, one portion of the North Station redevelopment may be in the short-term period, while another may not enter that phase for several years. Subsequently, the long-term productivity of the area will be the on-going and viable elements of the proposed urban redevelopment.

1. Short-Term Uses

The short-term uses are generally adverse and are related to the site preparation and construction activities. The primary negative impacts affect both the human and the natural environments and include property acquisition, building demolitions, the relocation of households and businesses, increased levels of noise and air pollution, a potential for temporary water quality degradation from the proposed canal dredging and island construction, disruptions caused by the development of new public and private improvements, hazards to public safety, and irreversible resource commitments. The costs of these impacts, which represent a loss of environmental quality, would be shared by all users of the local environment. However, when each phase of the project is completed, conditions would return to a new steady state, with the effects virtually eliminated and little permanent evidence of the temporary disruption (except of course, for the physical land-form changes resulting from the canal/island construction). Other aspects of the project, which entail outlays for construction employment and equipment and material commitments, would realize significant short-term beneficial returns in the form of jobs, personal income and business excise taxes, and new economic activity (the multiplier effect).

2. Long-Term Productivity

Permanent impacts of the project are expected to be primarily positive, although the redevelopment may also result in some long-term negative impacts. The long-term productivity of the project is the revitalization of this underutilized section of the City and the development of the various proposed elements into a cohesive, viable, segment of the urban community with a useful life span of at least 50 years. The long-term benefits of the project will flow directly from these development aspects.

The result should be an improved environmental setting, attractive to the proposed economic, social, and commercial activity. Primary positive impacts include:

- the elimination of blighting conditions and the physical and aesthetic upgrading of the project area.
- the arrest of further deterioration in the project's vicinity and the stimulation for extensive improvement, especially in the Bulfinch Triangle area;
- the construction of office and commercial buildings to provide needed space for such operations;
- the development of a new and improved sports arena facility, with its attendent benefits for spectators, participants, and local businesses; and
- substantial social and economic benefits in the form of employment and housing opportunities, personal, sales, and real estate taxes, and additional visitor-related businesses.

Costs will be shared by Federal, State, and local governmental agencies and private entrepreneurs, and the significant benefits of the long-term productivity of the development should accrue primarily to the users of the area and secondarily to all the City of Boston.

The major long-term negative impacts of the proposed project, which must be weighed against its long-term benefits, include increased traffic generation and increased use of the local street network, with potential circulation conflicts or congestion in certain areas, slightly increased noise and air pollution levels, additional burdens on utility systems and greater water consumption and sewerage generation, increased depletion of energy resources, and potential development pressures on adjacent neighborhoods. However, the costs of these adverse effects would be primarily local and could be minimized through careful design and the adoption of appropriate mitigation measures, as previously described.

C. Irreversible and Irretrievable Commitments of Resources

The proposed project would result in some irreversible and irretrievable commitments of resources. Development of the project as planned would involve the irretrievable commitment of some 50 acres of land and water in the downtown Boston area and generally would foreclose any option for alternative uses during the foreseeable life of the project, estimated to be at least 50 years (the Urban Renewal Plan itself would remain in effect for 40 years, until 2020). Physically, the major alterations from pre-project conditions would be the irreversible demolition of the existing buildings in the project area and the land-form changes resulting from the dredging of a canal within the northern portion of the land area and the construction of an island in the Charles River. These latter changes could have permanent local consequences on the hydrology of the Charles River Basin as well as temporary, but not irreversable, effects on water quality and a disruption of the aquatic resources. Because the project area presently supports little wildlife or vegetation, there likely would be no permanent decrease in the biological productivity of the area (to the contrary, productivity should increase due to the extensive landscaping and parkland propoasls of the redevelopment plans). Moreover, the commitment of this land resource to more intense development than now exists is not expected to involve the loss of any significant natural feature, historic property, or any unique view or resource. It is important to note too that this project does represent a continuation of urban devlopment of the site, which has undergone alteration by man since the early 1800's. Thus, the original state of the project area has been completely modified from an embayment of the Charles River to filled land supporting extensive railroad and transportation uses by the mid-19th century and the later addition of residential and commercial properties.

The construction of the new buildings, streets, utilities, and other public improvements would require the irreversible commitment of materials, labor, and energy resources. Tangible raw materials ranging from soil for fill and landscaping to structural steel, concrete, brick, wood, and other building materials would be required, as would new furnishings, fixtures, and equipment. Although comparatively no major commitments of these resources would be required, and none are considered to be scarce or would involve unusual quantities, most are, nonetheless, depletable. However, some of the construction material and furnishings potentially would be salvageable and could be reused when the project has reached the end of its useful life.

Human and social resources also would be irretrievably consumed to implement the project. The project would require an estimated 6,800 man-years of construction labor over a 15-20 year period, which would preclude its use elsewhere. To this estimate must be added an increment to account for the time of the various developers, planners, architects and engineers, managers, consultants, and government officials that is required to plan, review, and implement the project, including the social and organizational work of acquisition and relocation. Irreversible social commitments involve the displacement of an estimated 68 housholds and 49 businesses employing 1,059 persons.

Also irretrievable would be the expenditure of both public and private funds - estimated at approximately $450,000,000 - to carry out the project. The ability of the community to generate the necessary revenue and the accumulated capital to accomplish the project represents an irreversible commitment of fiscal resources. For the public sector, this commodity is in limited supply, and its commitment could represent either an increased tax burden or a reduction in the level of funding for publicly-funded programs and services should additional revenue sources not be available. In addition, long-term financial commitments would be made by private financial institutions and possibly by the Department of Housing and Urban Development for mortgage insurance, as well as potentially by the Commonwealth to retire bonds financing the new arena from an increased hotel tax. Such commitments would become irretrievable financial losses should foreclosure of any of the elements occur.

Upon completion of the proposed project, there would be the commitment of utility and community services to support the project and the necessary long-term public financial commitments to provide these support services to the urban redevelopment. These would include such local services as police and fire protection, sewerage collection and treatment, solid waste pick-up and disposal, and health and educational services, street maintenance and repairs, and the provision of public transportation services. Public and private buildings would require staff, upkeep, repairs, utilities, and protection. All of these would require the irretrievable use of labor, materials, money, and energy resources. While none of these resources could be considered unique, some material and basic energy resources, such as fuel oil, natural gas, and electricity, are, in the long-run, irreplacable since they are non-renewable. In addition, the increased demand for water could tax currently overburdened supplies, especially in drought years.

Increased traffic generation is expected to result in continued circulation and congestion problems at certain intersections. However, these adversities are not necessarily irreversible if mitigation measures identified in the Transportation section are implemented and there is renewed commitment to public transportation facilities to meet the increased commuter needs and to reduce dependence on private cars. Noise, air quality, and potential water quality impacts also would continue but should not be significant nor irreversible.

Part VIII COMMENTS ON DRAFT EIR/EIS AND RESPONSES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

August 13, 1982

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
Boston City Hall
One City Hall Square
Boston, Massachusetts 02201

RE: D-HUD-B89015-MA

Dear Mr. Mertens:

In accordance with Section 309 of the Clean Air Act, and the National Environmental Policy Act, we have reviewed the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for Phase I of the North Station Urban Renewal Project, Boston, Massachusetts.

My staff has most recently discussed air quality issues with you and your consultant at a meeting on July 27, 1982. As discussed at the meeting, we believe the project could improve air quality provided our concerns are satisfactorily resolved in the Final EIS and commitments are made to evaluate and implement reasonable and feasible mitigation measures at key intersections in the project area. These issues are described in the attachment.

Please be advised that due to changes in EPA program requirements, we have not evaluated the proposed action's impact due to noise and hope that other agencies at the state and local level will provide you with comments on noise issues.

In accordance with our national EIS rating criteria, a copy of which is enclosed, we have rated this Draft EIS LO-2 (lack of objections - additional information requested).

We look forward to working closely with the BRA to assist in addressing environmental issues associated with this and future North Station Urban Renewal activities.

Regarding Phase II of the project, which is to be addressed in a supplemental EIS, we pointed out in the scoping meeting that a permit under Section 404 of the Clean Water Act will be required for the development of the Charles River Island and Canal. As you know, EPA participates in the review of 404 permit applications and will evaluate proposed Phase II 404 actions using "EPA's Guidelines for Specification of Disposal Sites for Dredged or Fill Material" (45 FR 85335-85357) also known as 404(b)(1) Guidelines. As we discussed at the scoping meeting, we believe the Draft Supplemental EIR/EIS to be prepared for Phase II should include a 404(b) evaluation in compliance with our guidelines. In view of the significant potential of Phase II to impact hydrological characteristics and water quality in the lower Charles River Basin, we recommend that BRA consider a preapplication review session with the U.S. Army Corps of Engineers, EPA and other concerned State and Federal Agencies prior to the preparation of the Draft Supplemental EIR/ EIS.

If you have any questions or concerns about our comments, I hope that you will contact Donald Cooke of my staff at (617) 223-7223 as soon as possible so that any differences will hopefully be resolved prior to issuance of the Final EIS.

Sincerely yours,

Leslie Carothers, Acting

Lester A. Sutton, P.E.
Regional Administrator

Enclosure

cc: Samuel Mygatt, MEPA
Robert Ryan, Director, BRA
Heidi O'Brien, MA DEQE
Edward Machado, HUD, Boston Area Office
William Lawless, Operations Division, NED-COE

U.S. Environmental Protection Agency
Detailed Comments
North Station Urban Renewal Project, Boston, Massachusetts
Draft Environmental Impact Statement

PROJECT DESCRIPTION

The project area encompasses approximately 58 acres of land and water and is bounded generally by Causeway Street, Lomasney Way, Martha Road, the old Charles River Dam, the Charles River, and Haverhill Street extended. The proposed Urban Renewal Plan entails extensive transportation improvements, increased commercial and retail activity, and a riverfront development, principally through the creation of an island in the Charles River for 1,100 new housing units. A major catalyst for the redevelopment of North Station would be the location of the proposed GSA Federal Office Building in the area.

The development plan is proposed to be implemented in two phases over a 15-year period. Phase I of the North Station Urban Renewal Project, covered by this EIS, includes: a major office and commercial development, totalling 1,325,000 square feet in the Billerica Street area and on the site of the North Station/Boston Garden complex; an 800,000 square foot Federal Office Building, located generally between Lomasney Way and Nashua Street and including the vacant Madison Hotel parcel; a new sports arena on a 121,000 square foot site to accommodate a maximum of 16,800 persons; in the lower level of the arena a 500-car garage and a new North Station commuter rail concourse; between the Expressway ramps and the GSA Building a parking garage for 1,000 cars, replacing the existing surface parking lots which accommodate 605 cars; the demolition of the North Station/Boston Garden building and redevelopment of the site with an 80,000 square foot public plaza and a 400,000 square foot office building on Causeway Street, and retail and commercial uses at street level and along pedestrian walkways, 24,500 square feet (gross) of which would be located in the Federal Office Building. Our understanding is that the later phases of the North Station Urban Renewal Project will be addressed in a Supplemental EIS.

AIR QUALITY

- As you know, under the Clean Air Act, a project receiving Federal financial assistance must be shown to conform with the State Implementation Plan (SIP) and must not cause or exacerbate violations of the national primary ambient air quality standards. According to the EIS, there were no recorded violations of the 1-hour carbon monoxide (CO) standard, but four of five monitoring sites in the project area measured violations of the 8-hour CO standard. The CO modelling results contained in the EIS also predict violations of the 8-hour standard for existing conditions, but indicate that air quality standards in the future are not expected to be violated as a result of the proposed project. As my staff has discussed with you and your consultants, we believe that the 8-hour CO analysis should be revised taking into account the following:

② 1) The analysis should reflect current guidance on meteorological input data by using a wind speed of one meter per second and applying a persistence factor.

③ 2) The traffic data and cycle length used in the Draft EIS's analysis for Leverett Circle are different from the data used in the proposed Massachusetts 1982 SIP. We believe the Final EIS should include a discussion of why these data are different, and commit to implement a cycle length that will achieve attainment of the carbon monoxide (CO) standards at Leverett Circle in 1987, as required by the SIP.

④ 3) Tables A-7 through A-15 of the Draft EIS Appendices, present traffic data for peak and 8-hour volumes which appear to conflict with the volumes that would normally be expected to occur. Some of the peak hour traffic volumes are shown to be less than the average hourly volumes over an 8-hour period. The Final EIS should clarify this apparent conflict.

⑤ If the revised CO analysis indicates that levels greater than 8.0 parts per million could occur due to the project, the Final EIS should contain a detailed evaluation of and commitments to implement reasonable and feasible mitigation measures to assure maintenance of air quality standards. These could include traffic signal cycle lengths, parking controls at intersections, turning lanes, and routing of traffic, all designed to minimize traffic congestion. The EIS refers to these measures in summary fashion, stating that they will "be investigated in further detail during the engineering phase of the street improvements," and points out that these measures could have significant positive effects on the North Station circulation system. We believe that the air quality benefits that these measures could bring to the project area are potentially significant, and warrant more attention in the Final EIS. As stated above, if the revised CO analysis indicates a potential standards violation, commitments will have to be made to reduce air pollution levels.

⑥ - The Draft EIS acknowledges the existence of a parking freeze in the City of Boston and notes that because the project will create new parking spaces which are accessible to the general public for a fee and which are in excess of the existing 905 public spaces in the project area (Phase I calls for 1,500 public parking spaces plus 267 GSA spaces), an equivalent number of spaces will have to be eliminated elsewhere in the freeze area. We believe the Final EIS should contain a discussion as to how the parking spaces being created for this project are being accounted for under Boston's parking freeze.

- The Draft EIS incorrectly states on page V-72 that "The EPA has indicated that its primary strategy for the reduction of air pollution in Massachusetts is the implementation of the inspection and maintenance (I/M) program." While the inspection and maintenance program is an important part of the Massachusetts SIP for demonstrating attainment with National Ambient Air Quality Standards, it is one of many strategies. The statement in the EIS should be so revised and we would be pleased to assist you. ⑦

As stated in the cover letter, all of these issues have been discussed with you and your project consultants, and we believe they can be resolved satisfactorily.

EXPLANATION OF EPA RATING

Environmental Impact of the Action

LO -- Lack of Objections

EPA has no objections to the proposed action as described in the draft environmental impact statement; or suggests only minor changes in the proposed action.

ER -- Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating federal agency to reassess these aspects.

EU -- Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

Adequacy of the Impact Statement

Category 1 -- Adequate

The draft environmental impact statement sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 -- Insufficient Information

EPA believes that the draft environmental impact statement does not contain sufficient information to assess fully, the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft environmental impact statement.

Category 3 -- Inadequate

EPA believes that the draft environmental impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmenta hazards and has asked that substantial revision be made to the impact statement.

If a draft environmental impact statement is assigned a Category 3, no rating will be made of the project or action; since a basis does not generally exist on which to make such a determination.

Responses to Comments from

U.S. ENVIRONMENTAL PROTECTION AGENCY

1. It is acknowledged that a Section 404 permit will be required for the development of the Charles River Island and canal. Prior to preparation of the Supplemental EIR/EIS on Phase II of this project, the BRA will meet with the U.S. Army Corps of Engineers, the EPA, and other appropriate Federal and State agencies for a pre-application review, and a 404(b) evaluation in compliance with EPA Guidelines will be included in the Supplemental EIR/EIS, to the extent that the then-defined Phase II project proposals will require such evaluation.

2. An air quality analysis assuming an 8-hour average wind speed of 1 m/sec., as recommended by EPA, and a persistence factor of 0.8 indicated an apparent overprediction of 8-hour CO concentrations (see also Response #2 to the DEQE comments *infra*). As a result of further discussion with the EPA and DEQE, it was concluded that use of a wind speed of 1.6 m/sec. and a 0.8 persistence factor would result in a more accurate set of 8-hour predictions. The revised analysis has been incorporated in Part VI.H.2.3 of this document.

3. As was discussed with EPA, the traffic data used in the DEIR/EIS was more recent and reliable that that used in the SIP. For example, the SIP volumes used traffic counts taken before Interstate 93 was opened to the Central Artery and applied a common growth factor which itself is suspect as it represents a regionwide average and not necessarily core traffic growth. Both the distribution and magnitude of the SIP traffic, therefore, must be questioned. Although Leverett Circle is under the jurisdiction of the Metropolitan District Commission, the BRA is committed, in cooperation with the MDC, to implement improvements and changes at the Circle which would lead to the attainment of air quality standards (see letter to Mr. Kenneth Hagg, *seq*.). It should be noted, however, that the revised eight-hour air quality analysis (see Part VI.H.2.3 of this Final EIR/EIS) does show attainment at Leverett Circle for 1987.

4. The average eight-hour volume (10 A.M. - 6 P.M.) may at some intersections exceed the set P.M. peak-hour (5 P.M. - 6 P.M.), which the eight-hour period includes, due to the fact that some intersections serve major one-way inbound traffic volumes which peak in the A.M. and are off-peak in the P.M. An example of this is the Charles River Dam approach to Leverett Circle which is an inbound roadway where the P.M. peak-hour shows 659 vehicles while the eight-hour average, skewed in magnitude toward the A.M., is 757 vehicles. (See also Response #4 to the DEQE comments, *infra*.)

5. The revised CO analysis, taking into account the design elements of the future street system, indicate a potential violation only at Keany Square, for 1987. No violations are predicted for the year 2000. The increase in expressway lanes crossing the Charles River from 6 to 8, proposed as part of a Central Artery improvment project, would further reduce concentrations at this intersection, but this project could not be completed before 1987.

6. The Parking Freeze is currently being reviewed by the City of Boston for possible modifications, based upon a parking and development study that seeks to match future expected development against parking demand and supply, weighing the consequences of several options. One option is to allow certain projects, like North Station, to provide reasonable parking consistent with satisfactory access, above the current freeze level. This would directly account for North Station. Other options include allowing modest growth in the same area through restriping for "shrinking" cars and including designated spaces under the freeze, as well as commercial spaces open to the general public for a fee, as freeze spaces are now defined.

   If the freeze remains exactly as it is, the GSA spaces could obtain a freeze exemption as they would not be open to the general public, while the other net increase in parking would have to come from the freeze bank, which may or may not have the required number of spaces available when needed.

   Although it is presently premature to predict the changes which may be made in the freeze, current discussions emanating from the parking and development study envision allowing for North Station parking.

7. The sentence should be revised to read: "The EPA has indicated that its primary strategy for the reduction of mobile source air pollution in Massachusetts is the implementation of the inspection and maintenance (I/M) program," which was the actual intent of the statement.

Boston
Redevelopment
Authority

August 12, 1982

Mr. Kenneth Hagg
Department of Air Quality Control
Department of Environmental Quality Engineering
1 Winter Street
Boston, MA 02108

Dear Mr. Hagg:

RE: LEVERETT CIRCLE - ATTAINMENT OF AIR QUALITY STANDARDS

This letter is to inform you that it is our intent to have improvements implemented at Leverett Circle which would lead to the attainment of air quality standards. The planned street changes involve connections to Leverett Circle, so that it will automatically be subject to our engineering design work. Obviously, due to roadway jurisdictions, Leverett Circle changes would be in cooperation with the Metropolitan District Commission.

We will be pleased to keep you informed on this matter as the overall project proceeds.

Yours very truly,

Alfred R Howard

Alfred R. Howard, P.E.
Transportation Planning Director

cc: R. Mertens

1 City Hall Square
Boston, Massachusetts 02201
(617) 722-4300

Boston Redevelopment Authority is an Equal Opportunity / Affirmative Action Employer

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR

JOHN A. BEWICK
SECRETARY

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS

ON

DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT NAME:	North Station Urban Renewal
PROJECT LOCATION:	Boston
EOEA NUMBER:	3728
PROJECT PROPONENT:	Boston Redevelopment Authority
DATE NOTICED IN MONITOR:	July 8, 1982

The Secretary of Environmental Affairs herein issues a statement that the Draft Environmental Impact Report submitted on the above referenced project does adequately and properly comply with Massachusetts General Laws, Chapter 30, Section 62-62H inclusive, and the regulations implementing MEPA.

Comments to follow.

August 16, 1982
DATE

Samuel G. Mygatt, for
~~JOHN~~ A. BEWICK, SECRETARY

FORM D

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

EDWARD J. KING
GOVERNOR
JOHN A. BEWICK
SECRETARY

COMMENTS OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT NAME : North Station Urban Renewal

PROJECT LOCATION : Boston

EOEA NUMBER : 3728

PROJECT PROPONENT : Boston Redevelopment Authority

DATE NOTICED IN MONITOR : July 8, 1982 -

Although the impact analysis is adequately done, the DEIR rests upon a shaky footing. Buried in the proposal are contradictions and conflicts which, if not resolved, will be fatal to essential elements of the project and invalidate much of the careful environmental work done so far. The Final EIR, to be found adequate, must show these problems have been resolved.

Major problems occur in both phases of the project :

PHASE I

The requirements of Phase I have not been integrated and thus far do not appear compatible. The following elements must be adequately coordinated :

- ARENA. The Arena Committee has recommended construction of a new arena, although other proposals have been made to renovate the existing Boston Garden.

- GREEN LINE RELOCATION. The MBTA prefers a relocated elevated Green Line, via Accolon Way and curving to parallel the existing Expressway ramps.

- ACCESS ROADWAY. This road, which would parallel Causeway Street behind the Garden, is mandatory to avoid unacceptable traffic congestion and air quality violations caused by the closing of Nashua Street for the GSA building.

- COMMUTER RAIL EXTENSION. The existing tracks must be extended to accomodate the longer trains needed to serve future growth in Boston.

The Draft EIR should have shown how these features of the overall plan can fit together. Instead, the report quietly acknowledges that the commuter rail extension will not fit, while the MBTA is commencing its own planning to provide that very extension. The BRA agrees that the access roadway is necessary for traffic to move in the North Station area, but neither the MBTA (which must design its Green Line relocation above the roadway) nor GSA (whose building plans would close Nashua Street and make the roadway necessary) are aware of the BRA plan for the roadway. With planning for site clearance and GSA construction well underway, I am directing the MEPA office to convene a meeting at the earliest opportunity to discuss these conflicts.

PHASE II

The Phase II concept does not appear to make provision for the transportation requirements of the area and is at variance with less tangible but equally important river/parkland interests. With the conceptual viability of Phase II so much in doubt, the project could lose credibility and support to the point where only a GSA Building, possibly a new Arena and one office/commercial building would exist. These problems throw into question the wisdom of the heavy public expenditures required for Phase I development.

This comment on the Draft EIR next addresses these two major problem areas.

PHASE I

The Phase I proposal includes four major elements of the project. In brief, the Final EIR will need to show that a 295-foot wide arena, with parking, an elevated or subsurface Green Line ROW and station, extended commuter rail lines and the Lomasney-Beverly access road can coexist. While the parking could possibly be relocated, the remaining four elements enumerated are essential to the project as presently constituted.

As noted in the DEIR, the Green Line relocation is considered a precondition to any successful renewal of the project area. The need for adequate professional sports facilities, either a renovated Garden or a new arena, is readily apparent. The need for the access roadway is more subtle; ① it arises out of the fact that when Nashua Street is closed, its functions physically cannot be handled by an expanded Merrimack-Lomasney route (this was demonstrated in the Interim EIR). Finally, the need for extended commuter rail tracks is shown on page VI-68, and the MBTA is proceeding with plans for this expansion (see attached MBTA comment).

The Final EIR must demonstrate by elevations and profiles that the above elements are compatible. It must also demonstrate that the air quality levels of the access road, which is proposed to be underground, do not exceed standards.

ARENA

The New Boston Garden Corporation has filed a powerful comment, which should be responded to in detail. The comment states that Arena Committee members did not review the Garden Corporation's studies and drawings of proposed rehabilitation; in fact, we understand that the Garden denied the Committee's request to have its engineers examine the structure itself. There is much substance to the comment, though, and it appears that discussions between the Garden and members of the Committee should commence anew.

②

The Final EIR should also include the findings of the Arena Committee. Please clarify the width of the existing Garden. Figure III-12 shows it to be 200 feet. The Garden comment shows it at 240 feet. If 240 feet is correct, then the claimed advantages of a new Arena (295' width) over a renovated Garden may be diminished. The Final EIR should also explain and itemize the difference between the $56,830,000 cost for the proposed Arena which was relied upon by the Arena Committee, and the $77,830,000 cost figure now used. The Final should also, in its detailed discussion of the commuter rail/Green Line/ access road/arena area, substantiate that a 295-foot wide arena is realizable.

PHASE II

The Phase II proposal poses numerous problems. Seventy percent of the entire North Station project area is now devoted to transportation-related land uses. The Safdie development plan displaces many of these functions, yet the needs they serve cannot be ignored. ③

As comments on the DEIR make clear, the Nashua Street heliport is essential to the Commonwealth. Until an environmentally- and functionally-acceptable alternative site can be identified by the BRA, the heliport must remain in the Phase II development area. ④

The Central Artery connector ramps cut the project area in half. If allowed to remain, they generate air pollution and noise impacts which the Draft EIR acknowledges (p. VI-6) would be "extremely undesirable" for the hotel proposed for development on parcel 6. If a tunnel scheme is adopted by the DPW and the ramps removed, the channel and island urged by Safdie are adversely affected (DEIR : p. VI-6). Above-ground alternatives would be totally incompatible with the Phase II development concept. The Final EIR must point to a resolution for this dilemma. ⑤

The Phase II proposal is incompatible with recreational/open space/parkland goals of the MDC, is opposed by the Charles River Watershed Association and is sure to arouse further strong opposition from segments of the environmental community. These factors, plus the cost and disruption of creating an additional river channel, are arrayed against what seems to be little more than a designer's whim. ⑥

The bottom line is that the Phase II project is not yet credible, and the proponent and other participating agencies should recognize the possibility that Phase II will never go forward in anything like its current form. DPW Leverett Circle planning will probably go forward, with eventual changes subject to funding constraints, Other land uses are likely to remain status quo or continue with slight modifications. ⑦

The BRA's Phase II lesser-development option, which retains 100 Nashua Street and the Mass. Rehabilitation Hospital, inexplicably maintains the canal/island element, with decks over the at-grade commuter rail tracks (apparently creating river-edge "parkland" some thirty feet in the air).

This peculiar and discordant proposal cannot be seriously proferred. In our opinion, the MDC, which has a fine tradition of developing and enhancing the Charles River Basin, should continue with its efforts to propose a realistic plan for the park/open space development of the riverine portion of the Phase II area. The BRA should revise the lesser-development option in the Final EIR to retain the necessary transportation capabilities of the area and the Registry and hospital buildings, while deleting the island concept and developing a riverine treatment more compatible with MDC plans.

FEASIBILITY CONCERNS FOR PHASE I and Phase II

The revised roadway plan in the Draft EIR seeks to address the congestion problems on new Losmasney Way by the construction of an access road and underpass behind North Station connecting with Accolon Way and Beverly Street. Although it is not clear from the text and diagrams, it appears that the follow circulation changes are involved :

(a). The North Station commuter rail tracks are extended towards Causeway Street.

(b). The access road behind North Station begins at Nashua Street, slopes down rapidly into an underpass under the extended commuter rail tracks, and then rises very rapidly to meet Accolon Way at grade.

(c). The access road to the island passes over the secondary river channel, then drops very rapidly below grade to pass under the commuter rail tracks.

(d). A pedestrian plaza level covers the tracks at a second level and extends throughout the island and to North Station over the commuter rail tracks.

Several issues and problems are raised as a result of this new design proposal :

1. There are severe grade and intersection problems on the new access roads, with grades in the range of 15-20% or higher. ⑨

2. The vehicular underpass behind North Station would also be very expensive, because it might be required to support (a) the relocated Green Line elevated, (b) part of the new Arena, and (c) the extended commuter rail tracks. ⑩

3. The clearances between the water and the bridge crossing structures on the secondary river channel will be quite limited, with passage restricted to rowboats. ⑪

4. The island will contain extensive decking at 30-ft. or more above the river basin water level. ⑫

5. The underpass behind North Station may interfere with Alternative 5C for a Green Line tunnel connection between North Station and Nashua Street. The Green Line tunnel must remain above the Orange Line tunnel, so that the portal to the roadway underpass could be interfering with the same space for a Green Line tunnel. ⑬

6. The street plan shown in Figure VI.C-2 indicates a tunnel alignment different than Alternative 4, with the Green Line dropping from elevated at Leverett Circle to fully depressed at Lomasney Way. The grades on the transit line would appear to exceed 15%. ⑭

The BRA Project Implementation Schedule (III-25) either ignores the need for the access roadway behind North Station or consigns it to the 4-7 year period. The MBTA does not appear to have been informed of the need for the access road (see p. 3-19 and Figure 21 of the MBTA Draft EIR/EIS). The GSA project manager, whom we contacted, was not aware of any plan for an access road. ⑮

The access road behind must be constructed during Phase I, when the Green Line is relocated and the new Arena is constructed. In addition to this requirement for physical construction, the underpass roadway must for functional reasons be constructed before Nashua Street is closed. Similarly, Nashua Street should not be closed to traffic until Lomasney Way is reconstructed. Any closure of Nashua Street without the underpass access road connection to Beverly Street and and with Lomasney Way either under construction or subject to future construction, would result in very severe congestion during the interim period of project development. This requirement includes the period of Madison Hotel demolition. ⑯

The MBTA has indicated its preference for the Green Line Alternate #3, a relocation of the elevated structure. Would the piers for the new elevated transit line (page VI-60) be located in the middle of the underpass roadway or would they straddle the roadway, as now occurs with the Green Line along Lomasney Way? The tunnel roadway would need to be designed and constructed integrally with the new Green Line, and thus should be listed on page III-25 as being part of Phase I of the North Station project. ⑰

Plans and graphics need considerable attention. Although separate traffic and pedestrian circulation plans (pp. VI-13 and VI-54) may be easier to present, only when such plans are combined will their inconsistencies appear. As noted above, profiles and elevations in the Final EIR must show how the essential elements of the project can coexist and how they relate to one another. ⑱

The ultimate proposal for redevelopment of the area involves demolition of several significant buildings : Boston Garden, the Madison Hotel, the Mass DPW/Registry Building, and the Mass. Rehabilitation Hospital, in addition to numerous masonry residential buildings and businesses. Are any of these buildings structurally unsound and thus not subject to rehabilitation? Are there no new uses for these buildings except to demolish them at public expense and create a solid waste disposal problem? While the Boston Garden was not ultimately accorded National Register status, this does not mean that the building lacks all historic and aesthetic value, particularly as compared with recent arenas, exhibition halls and parking garages built at public expense. ⑲

Figure III-6 suggests that the Lockhart Building, at the corner of Causeway and Merrimack Streets, will be demolished or altered to permit reconstruction of that intersection. Such an action will have a severe adverse effect on views of the historic Bulfinch Triangle from Staniford Street. What are BRA's plans for that intersection and the Lockhart Building? ⑳

FUTURE CHANGES

The need to resolve the present inconsistencies and problems in the project may well bring about major changes in the proposal. Candidates for such changes include a decision to renovate Boston Garden, the retention of Nashua Street and abandonment of the Safdie Plan. If these or similar changes occur, the proponent should notify the MEPA office pursuant to 301 CMR 10.16, prior to the filing of a Final EIR. ㉑

TRAFFIC CIRCULATION

Although the Interim Report and the Draft EIR considered different local street circulation plans, neither report considered alternatives. The circulation plan considered in the Interim report was found to have serious traffic capacity problems, while the most recent plan appears to have very steep grades. The Final EIR must make an effort to present at least two practical and feasible local street alternatives, with an assessment of the traffic and related environmental impacts of each. Until such time as a practical alternative can be found, the BRA should develop plans to maintain Nashua Street as a through connection to Causeway. ㉒

Some review comments on the Draft EIR indicate concern that the traffic analysis does not include consideration of the worst peak activity days, such as a combination of an arena matinee with weekday commuter traffic. The Draft DEIR properly notes on page VI-17 that this condition is atypical. Furthermore, it is not clear that either a new or a rehabilitated Arena would produce a significant increase in visitors or auto traffic, compared with existing Arena traffic. Unfortunately, the removal of Nashua Street will result in a decrease in street capacity, and a removal of bus overflow parking, while the additional parking in the area will contribute more cars to the street traffic network. ㉓

The assessment of 1980 traffic conditions at Leverett Circle does not appear to reflect the common afternoon peak period conditions. The level of service of A to D claimed on page V-28 is not credible, based on the typical queuing conditions in the afternoon from Leverett Circle to beyond the Longfellow Bridge. The congestion period typically develops around 3 PM and extends until almost 6 PM, with observed level of service F. The key bottleneck will usually be the northbound Central Artery merge and weave, although the Southbound merge will also back up under unusual conditions of breakdowns or tunnel congestion. However, when the Central Artery is functioning without backups, the controlling bottleneck is at the upramp from Leverett Circle, where traffic must narrow down to two lanes. The Final EIR should assess the effect of roadway bottlenecks and provide a more accurate description of traffic congestion at Leverett Circle, both existing and future. The level of service calculations should be supplemented by an enumeration of volume-to-capacity ratios for the various key intersections. In this format, the incremental effect of the various construction phases can be compared with the No-Build alternative. ㉔

The No-Build alternative should be listed in the appropriate tables in the Final EIR, such as Table VI.C-1 on page VI-16. The most important factor in understanding project impacts is to determine the difference between the build alternatives and the No-Build. ㉕

Does the listing of existing parking on page VI-52 include any illegal parking in the area, both curbside and off-street? How does the recent parking inventory compared with the Wilbur Smith parking study of the early 1970s, in terms of inventory of actual parking? How does the net increase in parking in the area compare with the additional traffic to be generated by development? ㉖

The measures suggested (p. VI-49) to avoid adverse traffic impacts are unconvincing. Either they require major state/federal investments, or are so vague as to be meaningless. ㉗

AIR POLLUTION

DEQE and EPA have commented on the air analysis. Their comments should be responded to. ㉘

Apparently, neither DEQE, EPA nor the air quality consultant were made aware of the access roadway behind North Station. Consequently, air quality impacts of that link (in an area receiving heavy pedestrian use for the arena and commuter rail) were not modeled. It appears that the roadway network modeled was that used in the Interim EIR (see Appendix p. N-5 and the results VI-113,114), despite the fact that this network has since been discarded as unworkable due to traffic congestion. Nevertheless, the traffic volumes modeled in the DEIR (appendix p. N-7) were correctly drawn from FIg. VI.C-4 on page VI-38, which clearly shows the access roadway with 6339 ADT. ㉙

The access roadway should be modelled for the Final EIR. Given its encapsulation by the commuter rail tracks, Green Line and Arena, is Caline-3 a satisfactory model, or must canyon modelling (APRAC-1A) or tunnel modelling (point source) be performed? ㉚

TRANSIT

Consideration of the various Green Line alternatives has been a complex process. The Draft EIR considers three "Build" alternatives, but the logic for assessing the pros and cons of the various alternatives needs a clearer presentation. We understand that the MBTA recently voted a preference for a relocated elevated line. Several comments have questioned the wisdom of relocating an elevated transit line, when the existing line has severe environmental problems of noise, shadow, dirt and pigeons. There is a concern that significant public funds will be spent not to cure an environmental problem, but to relocate it. The Final EIR must contain a clear discussion of the pros and cons of this issue. ㉛

The transition zones of the Green Line alternatives deserve clearer identification. Page VI-61 is unclear as to exactly when the transitions occur. Discussion of alternative 5 should identify that portion of the transition which will constitute a barrier to any other passage. ㉜

PROPERTY TITLES AND OWNERSHIP

The excellent description of the history of tidelands provided in Appendix A (p. A-22) suggests that the property descriptions on pages V-20-25 are not as simple as stated. The issue of tidelands title and licenses to fill and utilize these tidelands is summarized by the observation that "Such conditions most likely apply to much of the North Station area." (A-22) It would appear that some uncertainty remains regarding land ownership. Renewal Plan should be identifying land ownership, particularly public ownership. From the description on page A-22, there may have been transfers of licenses on various parcels, or legislative acts making permits irrevocable, but the actual title to all the land between Causeway Street and the Charles River still remains with the Commonwealth. The implications for public reuse of the land through Urban Renewal actions can be quite significant if all lands in the area are publicly owned, and issues of public access --especially along the riverfront, become quite important. The importance of working out a suitable public access plan in conjunction with the MDC becomes even more significant for the BRA. ㉝

RIVER IMPACTS

㉞ Some environmental improvements in the project area are claimed as project benefits, yet technically they may not be part of the Urban Renewal project. For example, the MDC pollution control and CSO projects will probably be done independently of the North Station proposal.

㉟ The comment of the Charles River Watershed Association states eloquently the position of those parties concerned with preserving and enhancing the Charles River Basin for aesthetic and recreational purposes. The proposed Safdie plan enhances private and architectural access to the Charles River, but degrades the aesthetic and recreational potentials of the River. How does the riverfront in Phase II represent a public parkland and public access approach (page III-24) in light of the very private nature of the apartments? Overall, the island concept seems excessive in impact, costly to execute, and detrimental to the overall credibility of the North Station urban renewal plan.

㊱ The comment of the MDC clearly indicates a different concept of how the resource of the lower Charles River Basin should be developed. If 15% of the urban renewal area is water, and is thus under the jurisdiction of the MDC, is this section of the river to be treated by the conventional Urban Renewal standards of blight and decadence? How does the BRA propose to deal with land which is now under MDC or DPW jurisdiction?

㊲ In the Final EIR, the BRA must deal explicitly with the different plans which the MDC has for the Charles River. The Final EIR must include both narrative and graphics showing the MDC proposals and where they are similar or different from the current BRA plans.

ADDITIONAL PUBLIC COMMENTS

㊳ Several public agencies and private parties have provided comments on the EIR. Comments from others should be actively solicited. What is the position of the Mass. General Hospital and the Registry of Motor Vehicles, on land they are currently utilizing? With the changing plans for the state transportation building at Park Square, will the Mass Department of Public Works also be staying at 100 Nashua Street for an indefinite period?

The Mass. Aeronautics Commission has stressed the important function of the helipad near Nashua Street. Would the construction of housing be incompatible with the continued functioning of the helipad? If the helipad were relocated elsewhere, what would be the environmental impacts (especially of noise) in so doing? ㊴

Sept. 14, 1982
DATE

Samuel G. Mygatt, for
JOHN A. BEWICK, SECRETARY

Responses to Comments from

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS

1. The Phase I development proposal was designed by Moshie Safdie and Associates with the cooperation of the Boston Redevelopment Authority, the Arena Committee, the General Services Administration, and the Metropolitan Bay Transportation Authority, all of whom had direct input into the final scheme as presented in the Draft EIR/EIS (v. Fig. III-9). Consequently, all the parties which are responsible for the four major elements of this phase of the project - the Arena, the relocated Green Line elevated, the extended commuter rail tracks, and the Lomasney-Beverly access road - were aware of the total proposal and the interrelationship of the separate elements. As an example, the preliminary design of the Arena (v. Fig. III-12) incorporates within the structure the relocated elevated section of the Green Line. As requested, the compatibility of these various elements is graphically demonstrated by Figure III-13 of this document.

   Although the co-existence of all these elements may be difficult, preliminary engineering studies for the access road indicate that the problems are not insurmountable. Some limitations, however, may be imposed on the access roadway should the commuter rail tracks be extended into the Arena (as proposed by the MBTA). Because of the high groundwater levels in the area and the bridging that would be necessary to support the trucks and trains, the access road might have to be restricted to automobiles and light trucks only, in order to meet reduced clearance requirements.

   With respect to the extension of the commuter rail tracks (the subject of a Supplemental EIS to the North Station Green Line EIS, under preparation by the MBTA), the current Arena Committee scheme, which calls for two levels of parking beneath the arena proper, would conflict with the MBTA's proposal to extend the tracks. However, since the Arena is proposed to be constructed on air rights, physically the tracks could be extended through the lower level of the arena structure to a new commuter rail terminal on the south side of the building, which would require the removal of the parking levels. (These spaces, along with the separate 1,000 car garage behind the GSA Building, not only were proposed to serve the parking needs of the Arena but also are considered necessary as an income-producer to help cover the Arena's operating expenses and the principal and interest on the bonds needed to finance the facility. Should the commuter rail extension replace the parking in the arena structure itself, the Arena Commission probably would require an annual rental from the MBTA equal to the estimated parking revenue.) Extension of the tracks thus would result in the loss of 500 parking spaces originally proposed for the project area.

   There does appear to be a misunderstanding, on MEPA's part, of the functions of the access roadway. This roadway would not serve as a replacement of Nashua Street nor would it serve the function of carrying through traffic as does Nashua Street. The access roadway is proposed solely as an internal collector for the project area, giving access to and serving the land uses in both Sub-areas I and II. Through traffic would be carried on the widened Causeway Street and the expanded Merrimac/Lomasney route, which would be designed to handle the traffic demands placed on them, including the traffic now using Nashua Street. While the closure of Nashua Street is necessitated by the construction of the Federal Office Building, its replacement by the Merrimac/Lomasney route is a long-standing goal of the City to remove the excessive through traffic from the local streets of the historic Bulfinch Triangle area and to eliminate the considerable congestion within this area. Furthermore, the interim EIR did demonstrate that the Merrimac/Lomasney route could not handle, at peak hours, the total project-generated traffic because the original circulation scheme deposited all the project traffic onto Lomasney Way. The revised circulation plan of the Draft EIR/EIS distributed the internally-generated traffic to both Lomasney Way and Causeway Street, thus relieving the demand to be placed on Lomasney Way.

For a discussion of the air quality levels of the access road, see Response #30 infra.

2. The comments filed by the New Boston Garden Corporation are responded to in detail, as requested (v. infra.). Also, as requested, a summary of the recommendations and findings of the Arena Committee is included as Appendix C of this document.

   The width of the existing Garden structure, as indicated by its plans, is 205.96 feet. The 240 feet indicated in the Garden comments (page 2 of the attachment) includes a new northern wing addition to the building proposed by the present owners of the Garden to provide mechanical vertical circulation, new restrooms, and contemporary concession facilities.

   The $56,830,000 figure represents total costs for constructing only the Arena itself; the $77,830,000 figure represents total expenditures to construct the Arena and the associated parking facilities proposed by the Arena Committee (500 spaces on the lower two levels of the arena structure and 1,000 spaces in a separate garage structure behind the Federal Office Building). (See also Response #9 to Boston Garden Comments, infra.)

3. The transportation-related land uses of the present North Station project area include extensive parking lots, the commuter rail tracks and terminal, the Green Line elevated, and streets and expressways. The current redevelopment plan, which is based on the Safdie plan, retains the commuter rail facilities and the expressway system, relocates the Green Line, and modifies the existing streets to provide for a better circulation system routing through traffic around the project edges while giving access to local land uses. The existing 2,332 parking spaces would be replaced by 3,700 spaces serving both existing and new demands. Current plans provide for a replacement of the MGH parking lot by 800 spaces in the Phase II garage. With the relocation of the Massachusetts DPW and Registry functions to the new State Transportation Building in early 1984, the existing DPW parking lots would not be required to serve these agencies.

4. See responses to the comments of the Massachusetts Aeronautical Commission et al., infra.

5. Phase I development is planned for coexistence with the present Central Artery/Storrow Drive connector ramps. It has not yet been determined whether the existing ramps will remain, perhaps even in part, or whether new connectors will be created or what their design would be. The resolution to this dilemma lies in the planning and design of Phase II, which at this stage is only suggestive. The location and type of land uses will have to be carefully reviewed for compatibility with the major transportation facilities, and physical design features or alterations probably will be necessary to reduce potential negative impacts. In sum, Phase II will require extensive restudy for this and other reasons, as was set forth in the Draft EIR/EIS.

6. The Phase II proposal, although incorporating a somewhat different treatment of the open space, should not be considered incompatible with the recreational/open space/parkland goals of the MDC. As described in Section 3.2 of Part VI.B of this Final EIR/EIS, the MDC proposals include an equal amount of open space in the Phase II area as does the BRA preferred scheme. The major differences are that the MDC proposals consist solely of landscaped grassed areas with pedestrian and bicycle paths, a boardwalk along the water east of the commuter rail tracks, an at-grade crossing of the tracks by the pedestrian/bicycle circulation system, and the construction of small lagoon and island reflecting the Esplanade lagoon whereas the BRA proposal includes both park areas and a landscaped paved promenade along a new canal and a complete separation of pedestrian/bicycle paths from streets and rail tracks. No specific recreational facilities are included in the MDC plans, with the exception of a small boat landing on the artificial island; a boat landing and mooring facilities likewise can be accommodated in the BRA proposal.

7. For nearly three years the Authority has been proceeding on the basis that the North Station Urban Renewal Plan has two distinct phases. Phase I would be planned to a high level of definition, within the overall framework of the project, while Phase II would remain conceptual until a later time. The Urban Renewal Plan was submitted to the EOCD on this basis. The EOCD explicitly agreed to allow the Authority to undertake additional planning for Phase II while they gave approval to proceed with implementation of Phase I. The environmental review of the project is being done on the same basis. Phase II was included in the environmental analysis at the recommendation of State and Federal agencies despite its conceptual level of definition. Subsequent supplemental analyses will be undertaken by the Authority as the planning for Phase II makes sufficient progress. The Authority acknowledges that many of the questions raised in regard to Phase II are important but cannot be satisfactorily answered because the planning necessary has not progressed far enough at this time. The comments, however, help point the way toward issues to be examined and institutions to be brought into Phase II planning.

8. As noted above, the Phase II development alternatives are primarily conceptual in nature at this time, being suggestive of types of development that could revitalize this underused section of the waterfront. During the planning for Phase II, the types of land uses and the physical design features will be examined in much greater detail, and substantial refinements of the current proposals are entirely possible (and probable). The Authority is willing to cooperate with the MDC and other interested parties in defining an appropriate riverine treatment that would be, at the same time, complimentary to the ultimate development proposal. Since Phase II is so conceptual at this time, it is felt that it would be more fitting to include in the Supplemental EIR/EIS a revised lesser development option which would more truly reflect an alternative to the full-development proposal as then designed.

9. Based on a feasibility study of the access road prepared for the BRA by C.E. Maguire, Inc. (included as Appendix H of this document), the maximum grade for the tunnel section would be 12% if the MBTA commuter rail tracks are extended and the tunnel were to accommodate all vehicles. The minimum grade (MBTA tracks not extended, passenger vehicles only allowed) would be 4%. With the tracks extended, an intersection with Accolon Way would not be possible since it would fall within the incline of the access road. With only the MBTA platform extended, access to Accolon Way from the access road would be feasible, although this would be optimal only with the restricted vehicle option.

10. It is roughly estimated that the access roadway, including a vehicular tunnel supporting the rail tracks, would cost approximately $900,000.

11. The clearance between the water and the bridge crossing the proposed canal would be approximately 3 feet. This low clearance would not permit the passage of any boats at this location.

12. Although detailed designing of the island has not yet occurred, raising the surface level above the rail right-of-way (at approximately 30 feet) would be one option.

13. The access road tunnel behind North Station most likely would conflict with the subway option for the Green Line replacement, since the subway right-of-way and station platform would be at approximately the same level as the roadway. Detailed engineering studies would be required to determine the extent of the conflict and the feasibility of constructing both the subway and the access road tunnel. However, the MBTA has selected the relocated elevated option as the preferred scheme and will be pursuing more detailed engineering studies on this alternative.

14. Figure VI.C.2 has been corrected to show the preferred relocated elevated option.

15. The access road which runs along the northern boundary of Phase I of the project is vital to the development of Phase I as currently planned. It is expected to be constructed in conjunction with the proposed new arena and therefore should be identified as an element to be carried out in the 1-3 year time frame. The construction of this roadway was inadvertently omitted from the project implementation schedule.

There is no ready explanation why the MBTA Draft EIR/EIS does not seem to reflect their knowledge of the access road. Figure 21 in the MBTA Draft EIR/EIS, and to varying extent other figures as well, is indicative of earlier stages of Phase I planning which took its present form during the first half of 1981. The current plan for Phase I was the product of intensive planning during the early months of 1982. The project advisory committee, the GSA, the Arena Committee, and the MBTA participated in this process. We are sure that both the MBTA and the GSA know of the access road. The GSA in fact explicitly approved the Phase I plan including the location and configuration of the Federal Office Building site as well as the other major components of the plan. We suggest that the manager of the Federal building project for GSA may have understandably lost touch with some of the components of the Phase I plan in the past year since his attention had been trained on completing the design of the $70 million Federal building under a tight schedule.

16. The access road certainly must be established during Phase I, both because parts of it are physically integral to the Arena and the Green Line relocation and because it must functionally serve the Phase I parking facilities. We do not believe that the closure of Nashua Street requires the access road as a rerouting via Causeway Street and Lomasney Way is being provided. In an interim period this rerouting will take the form of a planned detour, to be replaced later by the permanent widening of Merrimac Street, Lomasney Way and a critical section of Causeway Street.

17. Because the Green Line elevated would be erected above the Sub-area I access roadway, both the roadway and the elevated structure would need to be designed and constructed integrally. The MBTA is expected to apply for Federal funds for the design and engineering of the relocated elevated, during which the location of the support piers would be determined. However, for the most part the elevated is proposed to be enclosed within the structure of the arena and the adjacent parking garage, the foundations for which would be expected to straddle the access roadway. Construction of the roadway has been added to Phase I of Table III-3.

18. Figure VI.C-6 does combine both the traffic and the pedestrian circulation proposals. Where pedestrian easements cross a vehicular roadway within the project area, they are separated, being at different levels. Figure III-13 shows, as requested, how the essential elements of the project coexist and relate to one another.

19. According to the BRA building condition surveys of the project area, 18 structures in Sub-area I were found to be substandard or structurally unsound; all of these buildings were masonry residential and commercial structures located in the Billerica Street blocks. A discussion of the possibility of rehabilitating these buildings was included in Appendix A (pp. A-25 - A-26) of the Draft EIR/EIS, in response to an earlier MEPA comment on the Interim EIR. The more substantial project area buildings are not substandard and some of them, particularly the Registry Building and the Massachusetts Rehabilitation Hospital, are in a satisfactory condition to allow continued use. The possibility of retaining buildings will be examined as the detailed planning for Sub-area II gets underway.

As noted in the Draft EIR/EIS, the Madison Hotel was vacant for several years. The Boston Housing Authority did investigate its potential for conversion to elderly housing but concluded that such would be economically infeasible because of the small rooms and layout. Although the Boston Garden could be renovated (as evidenced by the proposal of the current owners (q. v.)), the Arena Committee also investigated this option and concluded that rehabilitation would not be financially feasible. This conclusion, excerpted from the Committee's final report (the Arena Committee, "Final Recommendation", August 1981, pg. 11), is as follows:

> The Committee initially studied the option of renovating the existing Garden. The analysis determined that no financially feasible amount of renovation could overcome the Garden's architectural constraints and there would still be too many obstructed-view seats. The Boston Celtics have repeatedly indicated that a renovated Garden would be inadequate for their needs and consequently the Celtics would not be a tenant in the facility. Obviously, the Celtics are an important source of tenant income for any arena.
>
> In addition, with interest rates and construction costs being as high as they are, the Committee has been advised that it is very unlikely that any private firm could afford to adequately renovate the Garden without some form of public subsidy (i.e., property tax agreement/state-backed tax-exempt bonds). Therefore, the Committee concluded that it would be unreasonable for the City or State to take on these burdens of financial risk on behalf of a private firm.

The Draft EIR/EIS did not indicate that the Boston Garden building lacked all historic and aesthetic value. Rather, a description of this building (and the Madison Hotel) and its distinguishing features and architectural value was included in Part V.A.2 (pg. V-11). That these buildings do possess some merit was not denied.

20. Figure III-6 was in error; the BRA does not have any plans to demolish or alter the Lockhart Building for the reconstruction of the Causeway/Merrimac/Lomasney intersection. The current BRA proposal calls for a redesign of this intersection almost entirely within the existing right-of-way, with some minor land-takings within an adjacent vacant West End redevelopment parcel (v. Figure VIII-1).

21. If any major changes occur in the project plans, the BRA will comply fully with the requirements of 301 CMR 10.16 relating to project changes. At the present time, major changes are likely to occur in the design of the Phase II development. In accordance with the Specific Procedure established by EOEA for this project (v. Part I, pg. I-16), the BRA will consult with the MEPA office prior to filing of a Supplemental EIR/EIS on the Phase II development to determine whether additional filings or rescoping may be required.

22. Planning considerations severely inhibit conceptually different street circulation alternatives. First, the integrity of the "Bullfinch Triangle" bounded by North Washington Street, New Chardon Street, Merrimac

Street and Causeway Street must be maintained and, if possible, enhanced. This implies that any (new) circulation pattern should not violate this area and also should support the established plan for widening Merrimac Street and Lomasney Way as an extension of Congress Street to Leverett Circle, eliminating the use of Portland Street via Nashua Street as an arterial link. Given the planned widening of Merrimac/Lomasney and the desired "localizing" of Portland Street, the maintenance of the portion of Nashua Street to be discontinued in Phase I becomes unnecessary and even undesirable. The proposed Sub-area I access road eliminates certain problems posed in the Interim Report and has been documented as feasible in a feasibility study prepared by C.E. Maguire, Inc. (Appendix H). After further discussion, the MEPA office agreed that the alternatives presented in the Maguire study would satisfy the requirement to present "two practicable and feasible local street alternatives". Under the total circumstances, conceptually different roadway patterns, particularly for Phase I, are not discernable, nor have any been proposed in the DEIR/EIS comments.

23. EOEA comments seem to agree with the choice of weekday conditions as being appropriate. The additional cars attracted to the area by additional parking, as well as the changes in capacity, have been accounted for at all stages of traffic analyses. Even the interim detours for the Nashua Street closure are planned for service at current traffic levels even though during this time there will be a decrease in available parking in the area.

24. It is felt that the traffic analyses for Leverett Circle reveal the fact that observed congestion results primarily from interactions with conditions on the regional facility of the Central Artery and its other branches. The Circle, as a separate intersection complex, is shown to be able to serve the traffic volumes involved. It has been observed that the allotment of passage time to the key approaches, by signal or police officer, may not be equitable, favoring, on the average, the Charles River Dam approach over the Charles Street approach.

    The North Station project is keenly interested in seeing regional solutions for facilities which affect Leverett Circle, although the nature of solutions and the implementation of them rest with other agencies. The State is now in the process of engineering the North Area Central Artery project and developing concepts for the reconstruction of the Central Artery over the Charles River, which directly involves connections to Leverett Circle.

    Volume-to-capacity ratios for the key intersections are enumerated in Table VI.C-II of this Final EIR/EIS.

25. Table VI.C-1 has been revised.

26. The listing of existing parking on page VI-52 of the Draft EIR/EIS included only off-street parking and did not include curbside or illegal parking, which, it might be added, is becoming less as a result of more aggressive enforcement. The Wilbur Smith parking study inventoried about 1500 off-street spaces in the area in 1972.

Page VI-52 also discussed how the proposed new parking supply would match the proposed development. While it can be seen from Table VI.C-15 (of the Draft) that there is only a net increase of about 900 spaces over existing in the proposed supply of 1500 spaces in Phase I (plus designated GSA parking), many existing land uses are destroyed or converted, removing or accounting for at least part of existing demand.

27. The commentator himself previously correctly identified the fact that the congestion problems at key points are primarily caused by deficiencies in regional facilities, which would require major State/Federal investments; thus the DEIR/EIS can hardly be labelled unconvincing in this regard. Apart from the regional problems, the definite street designs proposed, properly operated, would give acceptable levels of service.

28. The DEQE and EPA comments are responded to separately (q. v.).

29. The access roadway behind North Station was taken into proper account in the 1-hr, 8-hr, and 24-hr analyses. This access roadway was schematically shown as link F_1 in Fig. A.1 of the BBN Air Quality and Noise Impact Analysis Report (v. Appendix N of the Draft EIR/EIS). The actual traffic volumes for the 1-hr, 8-hr, and 24-hr analyses for the year 2000 were given in Table A-3. For example, the ADTs for the No-Build, the Preferred, and the Optional alternatives for this link are O, 6339, and 4410, respectively. Table A-3 also showed that under the build alternatives, Nashua Street would be closed to traffic (as reflected by the zero entries for links C_1 through C_3). One-hr and average 8-hr traffic data for the approaches to the Lomasney Way/New Street (F_1) intersection were given in Table A-9.

    It should be noted further that link F_1 does not represent the roadway included in the Interim EIR but rather the revised internal circulation scheme as described in the Draft EIR/EIS.

30. As a result of a meeting between the BRA, the MEPA office, EPA, and DEQE, held 27 October 1982, to clarify traffic and air quality elements of the North Station EIR/EIS, it was agreed that modelling of the access roadway would not be required for this Final EIR/EIS but rather that a review of the ventilation requirements of the tunnel and underground garage sections should be included, with a more detailed impact analysis reserved for a later date when the design is more defined.

    Accordingly, the project engineers (C.E. Maguire, Inc.) were requested to investigate the need for ventilation for the proposed access road and Arena parking garage. A copy of their report is included as Appendix O of this document. In summary, Maguire concluded that the roadway tunnel section, although approximately 450 feet in length, should be provided with a ventilation system because of anticipated conditions such as heavy traffic congestion after Arena events and structure interference (arcade of the parking garage, expressway ramps) beyond the tunnel section. The amount of air required was estimated at 180,000 CFM. A semi-transverse system, where the exhaust (probably incorporated into the Arena parking garage exhaust system) would be located near the center of the tunnel on one side (southerly in this case) and which would utilize the tunnel portals as intakes, was recommended. The

Arena garage would require a ventilation of 6 ACpH (Air Changes per Hour). Approximately 200,000 CFM would be required. Fresh air would have to be brought into the garage from a point high above the ground level in order to avoid the partially contaminated air at street level. Similarly, the exhaust must be discharged as high as possible to ensure dispersion and to avoid compounding the potential contamination at street level. Maguire also concluded that the area of the access road under the arcaded portion of the proposed parking garage behind the GSA building would not require mechanical ventilation since the garage is planned to be a conventional, open-frame structure allowing adequate air distribution.

31. In positing the relocation of the Green Line elevated, the problems of noise, shadow, dirt and pigeons associated with the existing structure have been considered at length. By integrating a new elevated into the structure of a new arena and a parking garage, a crucial section of the line would in fact be enclosed, so that users would not have a direct sense of the elevation, compared to an exterior, free-standing line. In addition, the latest techniques of acoustical and structural engineering would be employed to improve the line in both its enclosed and open sections.

    One of the greatest problems with the subway option, besides cost, is the fact that it would involve a long (1,000 ft.±), open transition section in order to join with the existing elevated at Science Park. Such a transition section could not easily be crossed at ground level and would not lend itself to integration into any development

    The advantages and disadvantages (pros and cons) of each of the three build options for the North Station Green Line, as developed by the MBTA, are included as Appendix K of this Final EIR/EIS.

32. For MBTA Alternative 3 (Relocated Elevated Structure), the transition zone would occur south of Causeway Street, between the Haymarket exit ramp from the Central Artery and the existing subway-to-elevated transition zone. No new barrier would be created. For Alternative 5C (Partial Subway), the transition zone would begin just beyond the Storrow Drive Connector ramps and would rise, adjacent to the highway ramps parallel to Martha Road, to join the elevated Science Park Station. A new barrier would be created from the subway portal to Lomasney Way.

33. Existing property ownership in the renewal area, as determined from assessor's records, was described on pages V-20 to V-26 of the Draft EIR/EIS. Prior to any property acquisition, a title search would be required to ascertain actual title to the property. With regard to public access, particularly along the riverfront, the Urban Renewal Plan specifically requires pedestrian easements along the river edge, generally of a 50-foot minimum width (see Figure VI.C-6 and Appendix A of this Final EIR/EIS). Public reuse of the land (in the form of park area) and public access and pedestrianways were identified and discussed in several sections of the DEIR/EIS (v. Parts VI.B.3.1, VI.C.3, and VI.K.2). Details of public access will be examined, in cooperation with the MDC, in the development of a more definitive design and land use plan for Sub-area II by the BRA.

For an expanded discussion of tideland titles and the rights of public access, as it applies to the North Station area, see Appendix R of this document.

34. The Draft EIR/EIS clearly recognized the independence of the MDC pollution control and CSO projects and the new Charles River Dam from the Urban Renewal Plan (v. Part VII.A.2.7) and did not claim them to be project benefits. The environmental improvements of these projects will occur whether or not the North Station redevelopment is carried out.

35. The basic objectives for the Phase II riverfront area include aesthetic enhancement of the river and its edge, greatly improved public pedestrian access to the riverfront, and a mix of uses, including recreation, that will insure vitality of the area. The island concept meets these objectives by improving the physical definition of the main channel of the river without decreasing its width significantly or limiting in any way its use by pleasure boats; by providing continuity of water-edge pedestrian paths between the Esplanade and the North End waterfront where the route is at present discontinued because of the railroad tracks and other incompatible uses; and by substituting a mix of land uses including retail, residential, and hotel, as well as open space, to stimulate activity where today automobile storage predominates.

Public pedestrian access and pedestrian circulation routes with connections in all directions is ensured in this plan through the easements illustrated in Fig. VI.C-6 of this Final EIR/EIS. The entire outer perimeter of the island is reserved for public use in a 50-foot wide pedestrian way. Both sides of the proposed canal are similarly protected with a 50-foot wide easement on the south side connecting with existing pedestrian paths to the east and west, and a 20-foot wide easement at the north (island) side of the canal. Easements, both north-south and east-west, connect the Phase I and Phase II portions of the plan. In addition, Parcel 8, the 100,000 sq. ft. eastern third of the island, is reserved exclusively for public use to guarantee a major public destination at the island.

36. The MDC comments largely deal with Phase II and suggest, in not explicit terms, that they approach the treatment of the river basin and banks from a different philosophical basis than that reflected in the Safdie plan. While both the MDC and Safdie concepts have merit, we feel that the MDC's characterization of the Safdie plan is not accurate. It is not important now, but when the Safdie plan was being formulated the Authority sought unsuccessfully to meet with and/or receive plans from the MDC. As suggested by the MDC comments, the BRA is indeed proceeding on the basis of clearly distinguishing between Phase I and II, with Phase I at a more definitive state at this time. As Phase II planning progresses, the Authority will solicit the involvement of the MDC, MDPW, and others in this effort. The Authority will seek to coordinate this collective participation in the development of Phase II through cooperative planning, concensus building, and moral persuasion.

It is often the case that areas and buildings within the boundaries of an urban renewal area are not in themselves blighted or obsolete but are included, none the less, because they help to achieve the objectives of the plan. The Authority does not consider the Charles River to be blighted or decadent as measured by conventional urban renewal criteria and standards.

37. A description of the MDC park development plans for the Charles River Basin at North Station, together with a preliminary design and an evaluation of the proposals, has been added as Section 3.2 of Part VI.B of this Final EIR/EIS.

38. Copies of the Draft EIR/EIS, together with a request for comments, were sent to the public agencies and private parties listed on page II-4 of the Draft. The comments from those agencies and parties which responded are included in this Final document. The remainder, including the Massachusetts General Hospital and the Massachusetts DPW, apparently chose not to comment.

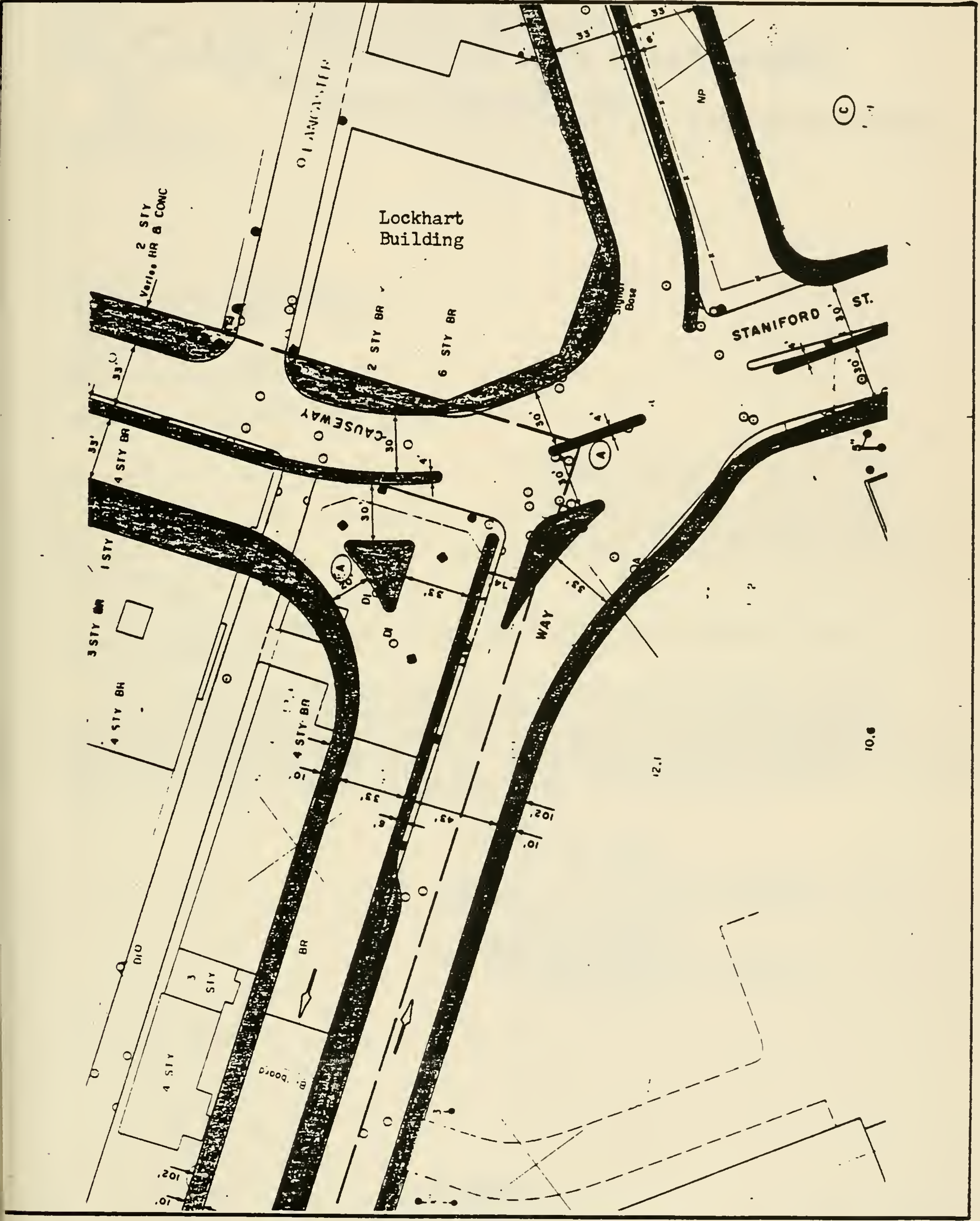
It is currently anticipated that the Massachusetts Department of Public Works will be relocating to the new State Transportation Building at Park Square in March of 1984.

As stated previously, the Authority intends to undertake a substantial planning program to develop and refine the plan for Phase II. The Authority will seek the participation of the Massachusetts General Hospital, the Massachusetts DPW, the Massachusetts Rehabilitation Hospital, and others in this planning effort. In addition, when a Supplemental EIR/EIS is promulgated for Phase II, comments again will be broadly solicited from all affected parties as they have been during the current EIR/EIS process.

39. The comments of the Massachusetts Aeronautics Commission are responded to separately (v. infra.). The proposed housing construction would be incompatible with the continued functioning of the heliport if the present site were retained, both in terms of the noise impacts and the safety factor of the closeness of the medium-rise residences. It should also be noted that retention of the heliport site likewise would be incompatible with the MDC park extension proposals for this section of the Basin. The specific impacts of a relocation of the heliport will be evaluated in the Supplemental EIR/EIS for the Phase II development should relocation of the site be proposed.

Figure VIII-1

CAUSEWAY ST., LOMASNEY WAY, MERRIMAC ST. & STANIFORD ST. INTERSECTION



EOCD

Commonwealth of Massachusetts

Executive Office of Communities and Development

Division of Community Services

100 Cambridge Street 9th Floor Boston, Massachusetts 02202 (617) 727-7001

Edward J. King, Governor
Byron J. Matthews, Secretary

August 10, 1982

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
City Hall
One City Hall Square
Boston, Massachusetts 02201

Attention: MEPA Unit - File No. 03728

Re: Draft Environmental Impact Report/
Draft Environmental Impact Statement
North Station Urban Renewal Project
Boston

Dear Mr. Mertens:

This Department has reviewed the subject report submitted by the Boston Redevelopment Authority.

It is noted that arena generated automobile trips have not been included in the survey and analysis of traffic in the project area. Departing matinee trips at peak home-bound hours should be considered. Also, the availability of an adequate number of parking spaces for arena events should be assured in ① order to avoid impacting adjacent areas. These concerns are particularly important to Option B, Reduced Development Plan.

Sincerely,

John F Bradshaw

John F. Bradshaw
Assistant Secretary
Executive Office of Communities
and Development

JFB/mb

Response to Comment from

EXECUTIVE OFFICE OF COMMUNITIES AND DEVELOPMENT

1. As set forth on page VI-17 of the DEIR/EIS, arena-generated automobile traffic was not included in traffic analyses because arena events are not scheduled during weekday hours but instead occur in evenings and at weekend matinees. Indeed even today parking for Boston Garden events must rely on the parking supply that is normally occupied almost fully by commuters and weekday visitors. Departing matinee trips thus would not occur at commuter home-bound hours.

   The estimated 2750-car parking demand for an arena activity would be well served by the 1500 commercial spaces on-site coupled with a number of nearby garages, including Charles River Park (over 700 commercial spaces), Government Center Garage (1865 spaces), and Polcari's Garage (over 600 spaces), as well as by an array of parking lots. The garages mentioned alone contain about 4700 spaces, representing a net supply of probably over 3500 spaces outside of weekday daytime hours.

The Commonwealth of Massachusetts
Department of Commerce and Development
Leverett Saltonstall Building, 13th Floor
Government Center, Boston, Mass. 02202

OFFICE OF THE
COMMISSIONER

(617) 727-3218

July 27, 1982

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
One City Hall Square
Boston, MA 02201

Dear Mr. Mertens:

In response to your letter of July 6, 1982 regarding the Draft Environmental Impact Report/Draft Environmental Impact Statement for the North Station Urban Renewal Project; the Department of Commerce and Development has no comments at the present time.

Sincerely,

Ernest A. Lucci
Commissioner

EAL:mw

cc: Secretary John A. Bewick
Executive Office of Environmental Affairs

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
323 New Boston Street, Woburn, MA 01801

ANTHONY D. CORTESE, Sc.D.
Commissioner
727-5194

MEMORANDUM

TO: Secretary, EOEA

FROM: Michael J. Maher, Acting Section Chief, Met. Boston/NE Region

DATE: August 9, 1982

SUBJECT: EOEA No. 03728, North Station Urban Renewal Project

We have reviewed the Draft Environmental Impact Statement/Report for the above cited project and have found some problems with respect to this report's consistency with the SIP; the comments should not be taken as our final determination as that is only given on a final document.

1. Consultation: Extensive consultation during the reports' scoping process occurred among project proponents, their consultants, and DEQE regarding the air analysis requirements--monitoring, pollutants to be addressed, methodology, etc. Comments made by DEQE at various points in the process are appropriately reflected in this report.

2. Adequate Air Analysis: Air analyses of different aspects of the proposal were performed. They are microscale and mesoscale analyses of the motor vehicle-related air pollutants and a point source analysis of the diesel emissions. The adequacy of each is discussed below.

a. Mesoscale Analysis was undertaken for CO, NO_x and HC emissions using the currently accepted MOBILE-2 emission factors applied to the transportation network within the North Station traffic impact area. It appears that the emissions from all roadways are accounted for, as are the emissions associated with parking facilities and trains. The analysis' results, as presented, are not consistent with criteria contained in the Massachusetts State Implementation Plan which states that "hydrocarbon emissions from the preferred alternative should be less than those from the no build case in both the short and long term." Furthermore, according to the criterion "in cases where hydrocarbon emissions from the preferred alternative are greater, then all reasonable and feasible hydrocarbon reduction/mitigating measures shall be included." Therefore, the project proponent needs to list commitments in the final report, along with their associated impacts upon future hydrocarbon levels. ①

b. Microscale Analysis of CO levels at 24 receptor sites was performed for the no build and build options for the years 1980, 1987, and 2000. The currently accepted MOBILE-2 program was used to generate the emission factors. The Caline-3 line source modeling technique was used to generate carbon monoxide values at selected receptor sites, from all roadways and parking facilities within the immediate area. DEQE's concerns relative to the analysis and its results are presented below.

② 1. In comparing the model results with the monitored results from the Merrimac and Causeway monitoring site - 2nd floor there seems to be a discrepancy in the range of 5 ppm in both the one and eight hour cases. DEQE is concerned that this may be due to the fact that the model results may have underestimated the CO levels actually occurring in this area. Given the underestimated results, it would be necessary in the final report to make allowances for such. This could be accomplished either through adjusting the previous modeling effort in some manner in order to derive more realistic values or to amend the current recorded levels with a graphical presentation (similar to that completed for the Copley Place EIR; see attached) that would indicate the limits of the model results in their current state for all cases. These values, in turn, would be used by DEQE to determine the need, if necessary, for mitigative measures in this area in order to alleviate the problem.

③ 2. DEQE is concerned that the Leverett Circle data and signal information as presented in this report and used in the air analysis does not coincide with the data used by the State in examining possible CO Hot Spots as part of the State Implementation Plan revision activities. It should be noted that the State has, as the result of its analyses, been able to show attainment at this intersection by 1987 in accordance with EPA requirements. Any changes from the factors used in the State's analysis may have the potential to create CO violations in 1987 and thus be inconsistent with the SIP. Therefore, it is suggested by DEQE that the project proponent commit in the final EIS/EIR to some scheme at Leverett Circle that would show attainment by 1987. In addition, the final report should include a letter of commitment to institute this scheme at Leverett Circle and a schedule for completion. The State, in turn, for consistency purposes will incorporate the EIS/EIR results in its current 1982 SIP revision.

④ 3. There is a need to further define within the final document the reasons behind the use of traffic data during a set hourly period rather then the traditional "worst case hour."

c. Point Source - Diesel Exhaust Analysis: An assessment of the total NO_x emissions emitted in this area was prepared in terms of the related impacts on the ambient environment and the necessary ventilation requirements if the train tracks were to be covered over. Questions raised by staff relative to the assessment are as follows.

1. This office would prefer to see the actual emission rates for the GM Model S-40 PH locomotive used in this analysis in order to provide a more appropriate emission rate that those presented in AP-42. ⑤

2. Further discussion should be provided supporting the use of 1/3 the projected peak hour train traffic in calculating the maximum emission rates. ⑥

3. P 29; In terms of the proposed physical modeling, the document should specify the conditions under which physical modeling will be done. Further, it is requested that the Department be present at some point in time to witness the appropriateness of this procedure. ⑦

4. It should be noted that there is a predicted concentration in excess of the 250 ugm/M^3 criterion set by the Department. In addition, the proposal relies on proposed modification of flow rates, stack location, and stack height to resolve the problem. ⑧

Should you have any questions on the above please contact Heidi O'Brien of my staff (292-5623).

MJM/hob/jm

Attachment

cc: Heidi O'Brien, DEQE/DAQC
Charles Mentos, DEQE/DAQC
Meng Chng, BBN
Mary Kelliher, Met. Boston/NE AQCR
Richard Mertens, BRA
Thomas Wholley, EPA

SOURCE: COPLEY PLACE EIR

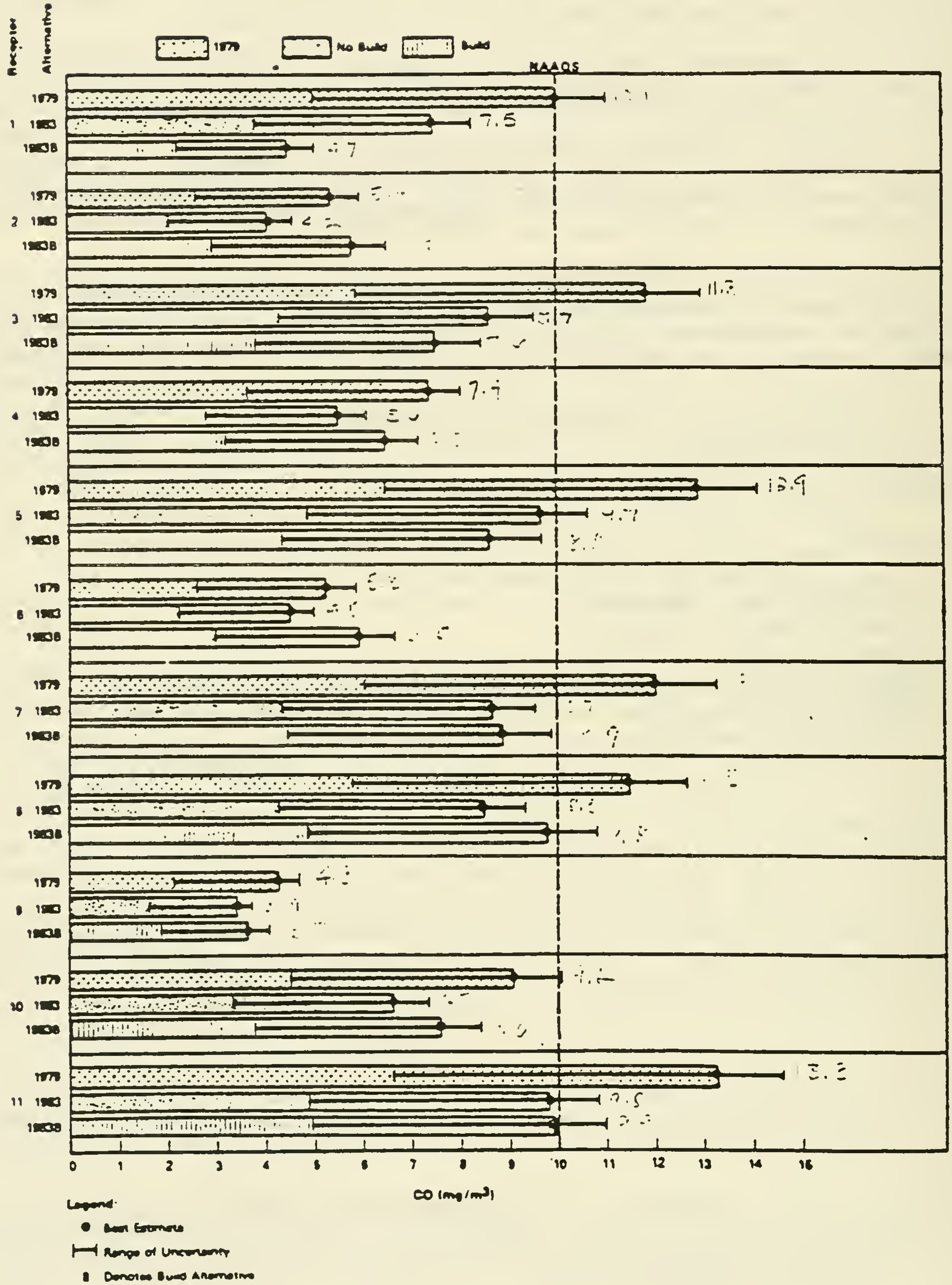


Figure B-5b Maximum Predicted 8-Hour Carbon Monoxide Concentrations at Selected Critical Receptors and Range of Model Uncertainty

Responses to Comments from

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

1. Reasonable and feasible hydrocarbon reduction/mitigation measures are identified in the Massachusetts State Implementation Plan. Several of these measures are directly applicable to the North Station project and their implementation can help reduce project hydrocarbon levels as a result of project development. These measures include the following:

   a. Improvements to mass transit service - The relocation and upgrading of the existing North Station Green Line facility, and the integration of a new station with the Orange Line and the commuter rail terminal to facilitate intermodel transfers is aimed at encouraging greater use of the public transportation facilities, particularly from the northern and northeastern suburbs. The North Station project is committed to the replacement of the present elevated with new and improved service which can serve to reduce dependency on the use of the private automobile by commuters destined to the North Station area.

      Along with improvements in the commuter rail and Green Line facilities, the MBTA has developed a Transit Park/Ride Improvement Program to improve existing park/ride facilities and to construct new or expanded park/ride facilities. The program to improve existing lots would increase usage by 1,000 spaces. The expansion program proposes the construction of 21 projects over the next five years, adding approximately 4,100 new spaces, including 1,500 spaces at commuter rail stations, 1,300 spaces at rapid transit stations, and 1,300 spaces for express bus parking. This program, aimed at increasing transit/commuter rail usage, would reduce daily VMT and thus emissions of HC.

   b. Highway projects - Implementation of the North Area project in the City Square area of Charlestown should improve traffic circulation on I-93, the Central Artery, and the Tobin Bridge and thus should reduce commuter use of the Charlestown Bridge/Keany Square as a bypass of congestion on the Central Artery Charles River Bridge. The Massachusetts DPW and the FHWA are committed to the construction of this project beginning in late 1985.

      In addition, the recent proposal of the Commonwealth to widen and depress the Central Artery in Boston to expand its capacity, if implemented, would significantly reduce the volumes of traffic passing through Keany Square and other North Station area streets and thus reduce the reoccurring problems of daily congestion in this area. The improved traffic flow resulting from this project would serve to reduce HC emissions in the area.

   c. Traffic-flow improvements - Elimination of on-street parking in the vicinity of the Keany Square intersection and strict enforcement of parking regulations would result in improved and more efficient traffic flow at Keany Square, which presently is a major bottleneck in the North Station area's street network.

Other street-related projects designed to improve traffic flow (and thus reduce emission generation) include adjusting signal phasing at Cambridge and Staniford Streets and at Leverett Circle, the latter in conjunction with the investigation of major capital improvements in this portion of the local road network. These measures are aimed at reducing idling and the formation of queues at these major intersections. The City of Boston is committed to the implementation of both these improvements (see letter from G. Alexander Taft, _seq_.).

d. Inspection and maintenance - Massachusetts began implementation of an Inspection and Maintenance (I/M) program in April 1983. This program, which provides for an annual inspection of automobiles with emission control devices and requires adjustment and/or repairs to insure proper functioning, is expected to reduce significantly the amount of hydrocarbons which vehicles emit.

e. Employee-based carpooling and vanpooling - Significant new employment is anticipated with full implementation of the North Station project, offering opportunities for the establishment of employee-based carpooling/vanpooling programs. In particular, it should be noted that the Federal Executive Board in Boston has established a Federal carpooling program, which would be made applicable to the new Federal Office Building. Furthermore, the use of employee carpools is encouraged under present Federal Property Management Regulations issued by the GSA governing the assignment of parking spaces by Federal agencies in GSA-controlled facilities. These regulations would apply to the new Federal Building. Carpooling would be encouraged further by the fact that Federal employees now scattered over many locations would be concentrated in one place, making trip-matching easier.

f. Variable work hours - Variable work hours has the effect of spreading the demand on highway (and transit) facilities, thus helping to reduce rush-hour congestion and to improve traffic flow. Many Federal agencies who would be relocated to the new Federal Office Building already have instituted staggered work hours ("flexi-time") and are expected to continue them at the new location. This program could be expanded to cover all or most of the agencies in the new building.

2. Table VIII-1 (on the following page) shows the measured maximum 1-hr and 8-hr CO concentrations at Receptor No. 1 (on the 2nd Floor) and No. 2 (on the 4th Floor) of the Causeway Street monitoring site. Four separate sets of modeling results are also tabulated. The background and modeling assumptions for these analysis are summarized below:

TABLE VIII-1

Comparison of Model Predictions vs. Measured CO (in parts per million) at Causeway Street

	1-HR		8-HR	
	2nd Floor #1	4th Floor #2	2nd Floor #1	4th Floor #2
Measured Maximum	26.4	21.1	13.8	10.0
1st Analysis (with APRAC)	24.0	22.7	14.4	13.6
Difference, Δ	-2.4	+1.6	+0.6	+3.6
Difference, %	91	108	104	136
2nd Analysis (with CALINE, 6/82)	21.7	16.7	8.8	7.0
Difference, Δ	-4.7	-4.4	-5.0	-3.0
Difference, %	82	79	64	70
3rd Analysis (with CALINE, 1/83)	21.7	16.7	17.2	12.9
Difference, Δ	-4.7	-4.4	+3.4	+2.9
Difference, %	92	79	125	129
4th Analysis (with CALINE, 8/83)	21.7	16.7	14.3	11.2
Difference, Δ	-4.7	-4.4	+0.5	+1.2
Difference, %	82	79	104	112

	1st Analysis	2nd Analysis	3rd Analysis	4th Analysis
Date	8/80	6/82	1/83	8/83
Model	APRAC 1A	CALINE 3	CALINE 3	CALINE 3
$U_{1\text{-hr}}$ (m/sec.)	1.0	1.0	1.0	1.0
$U_{8\text{-hr}}$ (m/sec.)	by scaling	3.0	1.0	1.6
$X_{1\text{-hr}}$ (ppm)	4.4	4.4	4.4	4.4
Persistence Factor	0.6	0.75	0.8	0.8
Comments	8-hr CO is obtained by multiplying 1-hr CO by 0.6			

A number of observations may be made about these results:

a. It appears that CALINE 3 may underpredict the 1-hr CO in those "canyon" type environments--especially for elevated receptors where the recirculation is an important factor. On the other hand, the high measured 1-hr CO may be the result of an unusual event (e.g., a motor vehicle idling under the two monitor sites). Since model validation was not performed, this difference between the measured results and the model predictions cannot be fully explained. Also, because there was no provision to calibrate the models, further adjustment of the modeling results should not be attempted.

b. Compared to the standards, the modeling predictions for 8-hr CO are of greater importance. The first analysis, using a 0.6 persistence factor, predicted 8-hr CO concentrations that were marginally higher than the measurements. The second analysis, using a wind speed of 3.0 m/sec, appeared to underpredict the 8-hr results. The third analysis, using a 1-m/sec wind speed and a 0.8 persistence factor, appeared to overpredict the 8-hr CO concentrations. The fourth analysis resulted in the best set of 8-hr predictions. This analysis used a wind speed of 1.6 m/sec and a 0.8 persistence factor.

3. As noted in Response #3 to the comments of the U.S. Environmental Protection Agency (v. supra.), the traffic data used in the Draft EIR/EIS was more recent and reliable than that used for the SIP. The SIP volumes used traffic counts taken before Interstate 93 was opened to the Central Artery (thus overstating the base case) and applied a common growth factor which represented a regionwide average (2.3% per annum) rather than a more accurate (based on City of Boston/BRA data) core traffic growth of 0.5% per annum. Consequently, both the distribution

and the magnitude of the SIP traffic are questionable. A letter of commitment by the BRA to implement improvements and changes at Leverett Circle, in cooperation with the MDC, in order to reach attainment of air quality standards has been included with EPA Response #3.

4. It was observed that, on the average, the highest peak hour of the day occurs in the afternoon, between 5 PM and 6 PM. This hour was chosen as a common traffic analysis hour for all intersections. In practice, individual intersections could vary in the timing of their worst hour, particularly at intersections with a major street which is dominantly inbound. Day to day and season to season variations at any one location also occur. Overall, it is felt that variations from the 5-6 PM set period do not, in the North Station area, depart significantly from a worst case condition. The choosing of the set period also facilitated analysis for the following reasons:

   - The balancing of network traffic counts among intersections where, as a practical matter, counts must be taken on different days is only practical by choosing a common hour. The balancing process picks up errors and inconsistencies.

   - The generation of peak hour traffic from proposed development for addition to future "background" traffic is tied to a common peak hour.

   - Peak eight-hour volumes which seem to produce air quality violations more frequently than the one-hour peak are much less sensitive to variations in the worst single hour.

5. To maintain consistency with the original analysis (BBN's Interim Report No. 4477, dated August 1980), emission factors from EPA's AP42 were used instead of data for the GM Model S-40 locomotive for the June 1982 analysis. DEQE agreed to the continuing use of AP42 in a meeting on 8 September 1982.

6. Based on conversations between the MBTA (Alan Castaline) and BBN on 18 August 1980, the average time that a train spends in the station during the peak hour is 20 minutes. This 20 minutes per train move over a 60-minute period is the "1/3" factor that was used in computing the average workload (hp-hr) and the resulting emission factor, based on this workload.

7. As agreed to in principle by the participants at 8 September 1982 meeting, BBN suggested that a re-modeling of the NO_2 impact should be carried out once detailed design data were available. If the results of this new analysis indicated a potential to exceed the 320 ůg/m^3 state policy level, then physical modeling might be warranted at that time--to verify the impact of the final design and to evaluate candidate mitigating measures. The Department will be free to witness the appropriateness of this procedure at its convenience.

8. In the meeting on 8 September 1982, DEQE indicated that the NO_2 criterion of 320 ug/m^3 (not 250 ug/m^3 as erroneously stated in the comment) would be applicable even if the source of emission is not a major point

source. Consequently, this policy level of 320 ug/m^3 would be applicable to assessing the impact of the train emissions for the North Station Urban Renewal Project. As indicated in the BBN report (June 1982), more detailed analysis would be warranted when detailed design for the venting system became available. The screening analysis done so far indicates a potential to exceed EPA's proposed 1-hr standard of 470 to 940 ug/m^3, which is less stringent than the state's 320 ug/m^3 policy level.

CITY OF BOSTON
OFFICE OF THE MAYOR
CITY HALL BOSTON

RECEIVED
AUG 2 1982

July 27, 1982

Mr. Jonathan G. Truslow, Executive Director
Metropolitan Area Planning Council
110 Tremont Street
Boston, Massachusetts 02108

Dear Mr. Truslow:

This letter is in response to your letter of June 23, 1982 regarding City of Boston "hot spots" in: 1. Kenmore Square; 2. Leverett Circle; 3. Cambridge Street at Staniford Street, and proposed Massachusetts Department of Environmental Quality Engineering (DEQE) recommendations to be included in the 1982 Transportation Element of the State Implementation Plan for air quality.

More specifically, the following is our reaction to each recommendation:

1. *Kenmore Square*

   It is requested that the recommendation proposed (Traffic signal cycle adjustment, removal of parking lane) for this location be re-evaluated after the current reconstruction of the Fenway roadway system (PARK-PASS PROJECT) which is scheduled for completion by the Fall of 1983. Since the purpose of the project has always been to provide more direct access to Storrow Drive from Brookline Avenue via Boylston Street, I think it reasonable to anticipate that Kenmore Square will also benefit from such improvements. It is understood that once this re-evaluation is completed the City of Boston will adhere to the recommendations made whether they include only a portion or all of the original DEQE proposed modifications.

DEQE Recommendations (cont.)

2. Leverett Circle

This location is within the jurisdiction of the Metropolitan District Commission. However, the City of Boston stands ready to work cooperatively with the M.D.C. to improve the air quality of this area.

3. Cambridge Street at Staniford Street

The City of Boston will adhere to the traffic signal phasing recommendations proposed by DEQE.

In addition to the above and in conjunction with the Mayor's decision not to support the construction of a third harbor crossing but to strongly support the formulation of creative traffic management techniques for improving traffic flow in both existing tunnels, I also take this opportunity to express my interest in receiving DEQE results and recommendations of their current analysis of air quality at the existing tunnel portals. Again, we look forward to working cooperatively with you in helping ease traffic congestion at these locations and therefore improve air quality.

Sincerely yours,

G. Alexander Taft
Mayor's Assistant for Transportation & Energy

GAT:PC:mcs

MASSACHUSETTS
BAY
TRANSPORTATION
AUTHORITY

50 High Street, Boston, MA 02110

August 31, 1982

Executive Office of Environmental Affairs
MEPA Section
100 Cambridge Street
Boston, Massachusetts 02202

Gentlemen:

SUBJECT: North Station Urban Renewal Project
Draft Environmental Impact Report/
Environmental Impact Statement
EOEA No. 03727

The Massachusetts Bay Transportation Authority (MBTA) wishes to comment on the Draft Environmental Impact Report/Environmental Impact Statement (DEIR/EIS) for the above-captioned project.

The DEIR/EIS identifies the issues which relate to the MBTA's transportation network at North Station and the plans for relocating the Green Line and upgrading the Commuter Rail terminal. Since the publication of this DEIS/EIS, the MBTA has circulated a DEIS entitled "Boston Green Line Improvements at North Station," which focuses on the relocation of the Green Line at North Station, and has selected Alternative 3, Relocated Elevated Structure, as the preferred alternative. Also, the MBTA is moving ahead with its plans for a major upgrading of the North Station Commuter Rail terminal as part of transportation improvements at North Station.

The upgrading of the Commuter Rail terminal and the relocation of the Green Line will give the MBTA the opportunity to integrate the transportation elements into the proposed developments. The Commuter Rail terminal will receive high-level platforms which will be extended to accommodate longer trains. The terminal waiting area will have new passenger amenities, with a public address system, television monitor for security and a train display board. Circulation between the transit modes will be improved and direct access to the developments will be provided. The Commuter Rail track interlocking will be simplified for easier train movements and track improvements will be made to milepost 1.

Comments

General - Throughout this whole report, constant reference is made to the Boston and Maine Railroad. Wherever this reference is made, it should be changed to MBTA Commuter Rail. ①

Page V - 34 - Third paragraph, the Merrimack Valley Line is properly termed Western Route. The New Hampshire Division is properly termed the New Hampshire Main Line serving communities northwesterly between West Medford and Lowell, MA (not Concord, New Hampshire). Strike reference of a branch to Woburn. The Fitchburg Division is properly termed the Fitchburg Main Line. ②

Page V - 36 - Commuter Rail boardings at North Station are 10,300. Bus #2 has been discontinued. ③

Page V - 52 - Figure V-21 - Zone C - Change Boston and Maine Railroad Right-of-Way to MBTA Right-of-Way. ④

Page VI - 11 - Transportation Facilities - The reconstruction of Accolon Way and the construction of internal access roadways may have an impact on the relocation of the Green Line elevated structure. The internal access roadway appears to be depressed under the extended Commuter Rail track. There is some question relative to the feasibility of depressing the road under the Commuter Rail track and the grade necessary for the depression to work. ⑤

Page VI - 61 - $40-45 million are 81 construction dollars. ⑥

Page VI - 63 - $75-85 million are 81 construction dollars. ⑦

Page VI - 64 - The boarding counts are not consistent with the "Boston Green Line Improvements at North Station" DEIS. ⑧

Page VI - 70 - 2nd paragraph - The MBTA has no plans for a light rail connection from North Station to the U.S.S. Constitution National Park. ⑨

If there are any questions relative to the MBTA's position at North Station, please do not hesitate to call me at 722-5045.

Sincerely,

James D. McCarthy

James D. McCarthy
Project Manager
North Station

JDMcC:aaf

cc: D. J. Kidston
J. K. Leary, Jr.
~~R. B. Mertens~~
E. O. Donnelly

Responses to Comments from

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

1. The correction has been made in the Final EIR/EIS.

2. The corrections are noted. The route terminology used in the Draft EIR/EIS was obtained from the MBTA's Preliminary Draft of the Draft Environmental Impact Statement - Boston Green Line at North Station Alternative Improvements. Route information was based on the MBTA Route System Map (1980).

3. The corrections have been noted. As the text indicated, the daily boarding information was based on 1980 data supplied by the MBTA. Bus Route #2 was taken from the MBTA Route System Map; this route also was shown on the Regional Transit Network map (Figure 17, page 3-10) included in the August 1982 Draft EIS for the Green Line improvements at North Station.

4. The correction is noted. Figure V-21 of the Draft EIR/EIS, however, is a Federal Emergency Management Agency, Federal Insurance Administration, map, not a BRA map.

5. The BRA's engineering consultant has examined the feasibility of the depressed internal access roadway, including the feasibility of constructing this roadway under the commuter rail track and the grade necessary for this depression to work. According to this evaluation, the construction of the roadway and the reconstruction of Accolon Way would not foreclose the opportunity to implement the MBTA's preferral alternative (Alternative 3 - Relocated Elevated Structure) for the Green Line relocation but would require careful coordination in the design and construction of these two transportation facilities, especially with regard to the placement of supports for the elevated structure (the problems would be minimized when the elevated is incorporated into the proposed structure). For a more detailed description of the compatibility, see Appendix H and Figure III-13.

6/7. It is recognized that the costs are 1981 construction dollars. These figures have been updated in the Final EIR/EIS.

8. As clearly noted in the text of the DEIR/EIS, the source for the boarding counts was the preliminary draft of the Boston Green Line improvements at North Station Draft Environmental Impact Statement, as revised in February 1982. Since the BRA's North Station Draft EIR/EIS was published in June 30, and the Green Line Improvements DEIS was not available until July 27, 1982, the revised MBTA data obviously could not have been included in the BRA document. The boarding counts have been revised according to the MBTA's current projections as contained in the Green Line Improvements DEIS.

9. The text was not meant to imply the MBTA presently has plans for a light-rail connection from North Station to Charlestown Navy Yard. The discussion was included in response to a comment by the National Park Service in the scope of the impact report/statement (see pg. I-35 of the DEIR/EIS). This idea also was explored briefly with staff of the MBTA during the preparation of the DEIR/EIS and some interest was expressed.

The Commonwealth of Massachusetts
Metropolitan District Commission
20 Somerset Street, Boston 02108

RICHARD A. NYLEN
COMMISSIONER

August 11, 1982

RECEIVED
AUG 12 1982
OFFICE OF THE SECRETARY OF
ENVIRONMENTAL AFFAIRS

John A. Bewick, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Attn: MEPA Unit

Dear Secretary Bewick:

Re: EOEA #03728 - North Station
Urban Renewal Project

The Draft EIR for the North Station Urban Renewal Project presents a two-phase development proposal, the second phase of which severely impacts MDC properties. The MDC has been responsible for the development and management of the Charles River Basin for some 75 years and has expended considerable public monies to assure that it would be a place of beauty for public use and enjoyment.

The completion of the new Charles River Dam creates a new controlled level addition to the Basin and a unique opportunity for a major new public open space. The MDC has been authorized to proceed with plans for the reclamation and enhancement of the area. It is regrettable that the Safdie plan as set forth by the Boston Redevelopment Authority takes no cognizance of the MDC plans and policies. The proposed plan appears costly, wasteful and destructive of a major open space. The scale is overwhelming, with the River diminished to two small drainage canals and 1,100 units overwhelming the remaining public spaces which are little more than landscaped sidewalks. ①

The environmental impacts of this overall proposal are not clearly addressed. It is requested that the final EIR clearly distinguish between Phase I of the project, Phase II and the "optimal development program" (which is never adequately defined). This Draft EIR, and it is assumed the final EIR, addresses only Phase I and a new EIR would be needed for any subsequent Phase work; the report should be organized and in part rewritten to reflect this distinction. ②

The following comments address specific items of concern:

1) PV-26, paragraph 4 correctly states MDC control of the Basin.

2) PV1-3, paragraph 3 is incorrect and must be corrected or deleted in the Final EIR. The proposed plan is in no way consistent with MDC plans for the area. The design philosophy is entirely different as are the landscape assumptions. ③

3) PV1-4, V1-5, paragraph 3. No justification for an island is presented nor are the land use impacts of this major land change addressed. Why an island? What does it accomplish in design, land use or socio-economic terms? ④

4) PV1-6, paragraph 5. What is the "reduced scale development proposal?" Is it the same as the "optimal development program referred to elsewhere in the report? Neither is adequately designed. ⑤

5) PV1-7, paragraph 4. It is incorrect to claim that the Phase II proposal is "similar to the Storrow Lagoon...." This should be deleted. ⑥

6) PV1-9, paragraph 4. A consistency is again implied that really does not exist. ⑦

7) PV1-42-43. The preferred plan has very poor levels of service. The "optional" plan appears to be more satisfactory, particularly in relation to Leverett Circle and Storrow Drive. ⑧

8) PV1, page 158, last paragraph. This an inadequate description of the "optional development program." Why create an island for an existing hospital? ⑨

9) PV1, page 160. The conceptual description is insufficient to assess impacts. No further comment is possible until a separate EIR has been prepared. ⑩

10) PV11-1 1.2 The existing basin area is now a public open space heavily used by the boating public. Either redevelopment proposal profoundly affects this area. ⑪

1.3 Significant disruptions would occur. ⑫

1.4 Major traffic disruption should be anticipated. ⑬

1.6 No mention of how island is created, edges stabilized, where fill is coming from, effects on existing seawalls, channel maintenance, etc. There will be issues as to the quality of dredge spoil, heavy metal content, smell, dewatering, etc. ⑭

1.7 See above. Water quality will be severely impacted. Anadromous fish runs will be impacted. Substantial fish kill should be anticipated. ⑮

1.8 There will be short term impacts on flood control measures. How would a 100-year storm during the construction period be handled? ⑯

1.9 See 1.7. ⑰

1.10 Smells will be noxious if major dredging and dewatering takes place on-site. ⑱

1.11 The hospital would be a sensitive receptor of noise impacts. ⑲

There is no discussion of mitigation measures for short and long term impacts. ⑳

We appreciate the opportunity to comment on this Draft EIR.

Sincerely,

Julie B O'Brien

Julia B. O'Brien
Director of Planning

JOB:kc

Respones to Comments from

METROPOLITAN DISTRICT COMMISSION

1. The most current MDC plans and policies for the North Station area of the Charles River Basin are described in Part VI.B.3.2 of this Final EIR/EIS. Contrary to MDC's assertion, the scale of the proposed development is compatible with the adjacent Charles River Park and Government Center developments, as well as with the proposed Lechmere Canal and Triangle Area development in Cambridge, on the other side of the river, which will include residential buildings of similar height and a riverfront promenade/park development not unlike that proposed in the Safdie plan for the North Station area, a plan endorsed by the MDC (Final Environmental Impact Statement/Report - Lechmere Canal and Triangle Area Development Project - Cambridge, Massachusetts, U.S. Department of Housing and Urban Development and Massachusetts Office of State Planning, 1979). Further, rather than diminishing the river "to two small drainage canals", the Safdie plan actually increases the water area by 1.6 acres. Although the island itself would reduce the river's width by a maximum of approximately 150 feet (from 400 feet) near the present constriction of the railroad bridge, the project would remove some of the filled area currently occupied by railroad tracks, thus improving the channel width.

   It should be noted further that when the Safdie plan was being designed, the BRA did attempt to meet with the staff of the MDC and to obtain their plans for the riverfront for incorporation into the Urban Renewal Plan but did not receive any response from the MDC.

2. It was clearly stated in the Introduction of the Draft EIR/EIS (pg. xii) that this document, in accordance with the Scope issued by the MEPA office (v. pg. I-16 of the DEIR/EIS) would address primarily the Phase I development (although the total impacts of the full-build scheme also would be included to the extent feasible) and that a Supplemental EIR/EIS would be filed for the Phase II development when that phase was better defined. This distinction between the phases likewise was clearly made throughout the report/statement. In addition, the commentator appears to have misread "optimal" for "optional".

3. The major differences between the riverfront park plans of the BRA and those of the MDC are that the BRA proposes a two-level, landscaped, hard-surface promenade between the canal and the proposed structures along the Storrow Drive Connector ramps (rather than paths within grassed areas and a boardwalk) and a complete separation of pedestrian circulation from the street system and the commuter rail tracks via overpasses (the MDC plans propose a dangerous at-grade crossing of the busy commuter rail tracks). The remainder of the park area would be landscaped as similarly proposed in the MDC plans. The total area proposed for park development by the MDC is estimated to be approximately 5.9 acres, only slightly greater than the 5.5 acres of open space along the canal in the BRA preferred plan. Thus, in concept, the proposed BRA park plans are consistent with those of the MDC. It is recognized, of course, that the urban elements of the BRA proposal (the

residential island and commercial development along the Connector ramps) are not present in the MDC scheme, which retains the existing buildings, open parking lots, and the commuter rail tracks.

4. The objectives of the design and land-use planning for the river edge portion of the Renewal Area emphasize (1) aesthetic enhancement of the river and shoreline; (2) continuity of the pedestrian and bicycle routes between the Back Bay Esplanade and the North End waterfront; (3) maximized river-edge pedestrianways; (4) a major public river-edge destination; (5) a mix of water-related uses that will ensure activity; and (6) a type of development compatible with the character of the adjacent downtown area.

   The island concept was selected as best meeting the objectives. In creating the island, the width of the main channel is not significantly reduced; instead the existing shoreline is enhanced through improved architectural definition (granite bulkheads) and a second channel is dredged to double the water-edge walkways and bring the river closer to the downtown areas. The entire island perimeter, as well as the new canal edges, are devoted to public use insured by public easements, as is the eastern portion of the island with its museum. The concept includes a deck over the commuter rail tracks to recapture as public and private space this barrier to continuous pedestrian circulation around the shoreline of the Boston peninsula. The character of the shoreline treatment blends the existing island-and-lagoon scheme, which is appropriate as an edge for the residential Back Bay, with more intense uses and greater density of development as is appropriate to the mixed-use character of the downtown.

   Waterfront development in Boston has proven to be a strong generator of activity and has stimulated the improvement of adjacent areas. The river edge improvements at North Station will encourage an exciting mixture of retail, hotel, residential, and recreational activities to provide a vital social environment where at present surface parking lots predominate. The enhancement and expansion of the water area will increase the economic value of the land nearby by emphasizing the riverfront location, thereby encouraging the planned higher uses.

5. The "reduced scale development program" is the "optional" (not "optimal") development program, which was described in Part IV.D of the Draft EIR/EIS. The synonymity of these two terms was clearly recognized in this section and throughout the report/statement.

6. The similarity of the new island and canal to the creation of the Storrow Lagoon by the Esplanade islands was described by Safdie in his report to the BRA (A Development Plan for: North Station District).

7. The riverfront redevelopment plans are not inconsistent with the long-standing, but rather sketchy, open space plans proposed by the MDC and others for this portion of the Charles River Basin. These plans*

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* Metropolitan Area Planning Council/Metropolitan District Commission/ Department of Natural Resources, Open Space and Recreation Program for Metropolitan Boston, Vol. 3, The Mystic, Charles, and Neponset Rivers, April, 1969.

have called for the public acquisition of the edges of the water basin between the old dam and the Coast Guard Station in the North End and their landscaping as an urban park area. The report further states that "(r)estaurants, viewing platforms and pedestrian bridges and walkways should be designed as part of the total development program" (p. 36). The North Station proposal includes a landscaped park between Lomasney Way and the new canal and a pedestrian promenade, with restaurants and retail stores opening onto it, along the east-west section of the canal, a concept which would appear not to be substantially different from the above-referenced concept. The MAPC/MDC/DNR report also noted that it was "essential" that the river bank between the two dams be acquired for public park purpose at the same time the new dam was funded, but the MDC apparently did not pursue this recommendation.

8. The "preferred" and "optional" plans essentially refer to Phase II development, since Phase I is identical under either option. Regarding the comparative levels of service between the two plans, it should be noted that it is likely that Phase II in general will undergo extensive changes during further design development. Nonetheless, the comparative analysis presented in this document does serve the useful function (which is the purpose of an environmental impact report or statement) of identifying potential areas of unacceptable environmental impact in order that proposals may be modified to the extent that the projected adversity is either avoided or minimized.

9. The optional development program was fully described in Part IV.D. of the Draft EIR/EIS; the paragraph referenced in the comment describes the urban quality impact of this alternative.

   The Optional Development Program satisfies the objectives of the preferred program regarding riverfront treatment (see response #4 above) while meeting the following additional criteria: (1) maximize the amount of park-like open space at the water's edge; and (2) enhance the economic feasibility of Phase II by reducing the public cost for acquisition and relocation. The Optional Program provides considerably more open space (10.2 acres) than the Preferred Program at the expense of the lively mix of uses that the more intensive development could offer. The character of the parkland would be more like the existing Esplanade to the west than in the Preferred Program. Most significantly, the riverfront improvements, as in the Preferred Scheme, would vastly upgrade the character of this underutilized land by underscoring its water-edge location.

   Economic feasibility of Phase II is enhanced by retaining the major existing buildings - the Registry of Motor Vehicles and the Massachusetts Rehabilitation Hospital. Although roadway improvements identical to the Preferred Program are included in this scheme, access to these buildings is preserved by reversing the Registry entrance to the south side of the building and by retaining the driveway to the Hospital and extending it to the new Lomasney Way.

10. As noted previously (see Response #2 supra), a Supplemented EIR/EIS will be filed on the Phase II development when a development proposal and design have been more specifically defined and the island concept retained or revised.

11. The statement referenced was meant to refer to land-based public open space only. Construction activities within or adjacent to the basin area would have temporary affects on the use of the river, but in the long-term the redevelopment proposals will not affect the accessibility or enjoyment of the Basin to the boating public.

12. The significance of potential disruption can only be determined following a specific analysis, which will be undertaken as part of the Phase II Supplemental EIR/EIS.

13. Construction activities related to the construction of development, streets, transit, utilities, etc. could cause major traffic disruption during the temporary periods (some of considerable length) during which they occur. The planned provision of detours for interim conditions, as is being done in Phase I, should control the extent of disruption. Copley Place offers a recent example of significant street and ramp detours which were implemented during lengthy construction periods, with reasonable success.

14. As noted, all of these issues will be examined in detail in the Phase II Supplemental EIR/EIS, should the proposed island and channel concept ultimately be pursued.

15. See Response #14. The extent of fish kills (if any) will be examined in the Supplemental EIR/EIS but cannot be categorically claimed at this stage of project development.

16. Proposals on flood control measures and storm events during the Phase II construction period will be examined, as noted above, in the Supplemented EIR/EIS.

17. See Response #15.

18. The issue of smells will be examined in the Phase II Supplemental EIR/EIS, should major dredging and dewatering take place on-site.

19. Noise impacts at the Massachusetts Rehabilitation Hospital were analyzed in Part VI.1.2.2. of the Draft EIR/EIS (pg. VI-135).

20. Discussion of mitigation measures for both short-term and long-term impacts were included, where appropriate, under each impact category of Part VI of the Draft EIR/EIS (v. Introduction to Part VI).

mapc
METROPOLITAN AREA
PLANNING COUNCIL
110 TREMONT ST.
BOSTON, MA 02108
Tel. (617) 451-2770

August 16, 1982

The Honorable John A. Bewick, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attention: MEPA Unit

RE: Proposed Redevelopment of the North Station area,
City of Boston (MAPC #EIR-82-21, Received July 7, 1982)
EOEA #03728

Dear Secretary Bewick:

In accordance with the provisions of Chapter 30, Section 62 of the Massachusetts General Laws, the Metropolitan Area Planning Council has reviewed the Environmental Impact Report/Impact Statement for the North Station Urban Renewal Project. The Impact Report covers phase one of extensive redevelopment of the North Station urban renewal area. The Council finds that there are a number of items which remain of concern in the Draft. These are itemized below:

(1) Noise. The ambient noise levels in the project area are so high (over 70dB(A that they exceed the levels at which there is moderate impact upon human activities including sleep, speech and other physiological functions. The EIR points out that it may be possible to design buildings such as office space or hotel space to screen ① out the effects of the ambient noise. However, these measures may be very costly. In addition, there is no mention made of the impact of noise upon the extensive open space which is one of the main features of the project. Such high noise levels, ② which the project will not be able to reduce in any way since most of the noise is from nearby highway structures, may significantly reduce the value of open space and the attraction of the area for pedestrians. (In addition, the phase-two plans ③ for 1,000 units of residential space could be seriously hindered by these noise levels).

(2) Traffic. The project would have a significant negative effect on four intersections in the North Station area--Leverett Circle, Keany Square, Lomasney Way at Causeway Street (Lowell Square) and Causeway Street at the Expressway ramps. The only mitigations offered to ease the increased impact on these areas are the ④ proposed plans for major changes in the interchanges of I-93 and the Tobin Bridge, and the possible relocation of the Storrow Drive-Central Artery connector ramps and the reconstruction of Leverett Circle itself. These are projects which have not yet been fully studied or approved, and there is no timetable for such major street improvements to be made at this time. Until such changes are made, it appears there will be a deterioration of levels of service at these sites.

(3) Water. Though this is not the alternative preferred by the Boston
Water and Sewer Commission, the North Station development might provide the ⑤
opportunity to separate the storm drain and sewerage system in the area. The
potential to exceed Boston's safe level of water use by 1990 is a matter of
concern, and specific conservation measures and the resulting reduction in water
use should be designed into the plans of all buildings and facilities, including ⑥
repairing leaks in existing pipes uncovered during construction. Although this
Statement does not specifically deal with the Second Phase proposed for the area,
the building of an artificial island in the river appears to be a point of major ⑦
concern for future study.

(4) Air Quality. The EIR states that the area will be in compliance with
CO and NMHC goals by 1987, based on plans directed by state and federal agencies
which have not yet been implemented and may be subject to delay. This finding ⑧
is also inconsistent with the letter from DEQE to MEPA stating that the area has
been out of compliance with CO standards and will be for the forseeable future.
In addition, the figures cited show the project to be inconsistent with the SIP
in terms of mesoscale analysis of hydrocarbons in the Boston region. We under- ⑨
stand that there have been recent meetings between DEQE staff and the project
proponents; the potential incompatibility between the new development, particularly
the residential and open-space portions of the plan, and serious air pollution
needs to be resolved with specific design revisions for mitigation.

The Council appreciates the opportunity to comment on this proposal.

Sincerely,

Jonathan G. Truslow
Executive Director

JGT:jtg
cc: Edward Bates, MAPC
Ms. Eugenie Beal, MAPC Rep., Boston
Ms. Heidi O'Brien, DEQE
Ms. Judith Wagner, MAPC
Mr. Richard B. Mertens, BRA
Mr. Alfred Howard, BRA

mapc
METROPOLITAN AREA
PLANNING COUNCIL
110 TREMONT ST.
BOSTON, MA 02108
Tel. (617) 451-2770

RECEIVED
AUG 10 1982

JUL 19 1982

DATE: July 7, 1982

I.D. #: EIR-82-21

TO: Eugenie Beal

COMMUNITY: Boston

Enclosed is a description of the project referenced below.

The Council requests that you consider whether this report adequately describes the project's impact upon your community and addresses significant environmental benefits and potential damages.

PROJECT TITLE: North Station Urban Renewal Project

THE COUNCIL HAS ONLY 15 CALENDAR DAYS TO FILE COMMENTS WITH E.O.E.A. TO MEET THIS DEADLINE, YOUR COMMENTS MUST BE RECEIVED AT THE MAPC BY August 6, 1982

☑ ADEQUATELY DESCRIBES ENVIRONMENTAL IMPACTS

☐ MERITS FURTHER ENVIRONMENTAL STUDY

☐ NEED MORE INFORMATION

EXPLANATORY COMMENTS:

SIGNATURE: Eugenie Beal

DATE: Aug. 6, 1982

zabetn A. Bransfield, president William C. Sawyer, vice-president Richard M. Doherty

Responses to Comments from

METROPOLITAN AREA PLANNING COUNCIL

1. It is acknowledged that ambient noise levels in the project area and vicinity are high and that L_{dn} levels do exceed HUD standards for a noise-sensitive location (e.g., housing sites, open recreation areas). However, these noise levels are not atypical of a downtown urban environment. Although L_{dn} levels exceed 70 dB(A), nighttime noise levels would be considerably lower because of the reduction of vehicular traffic on the major arterials and expressways adjacent to the project area and the fact that transit and commuter rail operations do not occur between the hours of 1 am and 5 am.

2. Receptor #3 (located at the western end of the proposed island) would most closely approximate the noise impact upon the proposed open space in the project area. For a location on the western side of the proposed canal (within the park area) another 2-3 dB could be added, resulting in a future (Year 2000) noise level of 76-77 dB(A). However, this noise level would not be appreciably different from that currently experienced on the Esplanade along Storrow Drive (estimated at approximately 70-73 dB(A)), which does not seem to reduce the attractiveness of the Esplanade for pedestrians and other users of the parkland.

3. Future noise levels within the proposed housing site on the island were modelled at 69-74 dB(A), which levels, although exceeding HUD acceptability criteria (being in the "normally unacceptable" noise zone), are similar to those experienced at the Charles River Park housing. Noise attenuation measures, such as the installation of double-glazed windows, would be required in order to provide a more acceptable interior noise environment. The addition of noise barriers along the expressway ramps and bridges, which has been suggested as a mitigation measure, could further reduce noise levels in the housing area.

4. It must be admitted that, failing a major reconstruction of the Central Artery involving an increase in the number of expressway lanes crossing the Charles River, there would be significant deterioration at key adjacent intersections, notably Keany Square, even with the no-build option. Since the distribution of the Draft EIR/EIS, however, there has been a dramatic shift in state policy which has assigned top priority to a Central Artery reconstruction, along with intensified planning work (see, for example, Federal Highway Administration/Massachusetts Department of Public Works, *Supplement to the Draft Environmental Impact Statement/Report-Third Harbor Tunnel, Interstate 90/Central Artery, Interstate 93, Boston, Massachusetts*, (FHWA-MA-EIS-82-02-DS), June, 1983).

5. The Boston Water and Sewer Commission has determined that the existing Nashua Street Combined Overflow Conduit could remain in place in Sub-area I and be incorporated into the new Federal Office Building. (Since this conduit is now connected to the MDC's Charles River Estuary Pollution Control Facility in Charlestown, the potential for pollution of

the harbor waters has been significantly reduced.) It is anticipated that all other sewer lines will be abandoned and relocated, if necessary. All new sewer lines in the project area would be constructed as separated storm drain and sanitary sewerage lines.

6. As noted on page VI-76 of the Draft EIR/EIS, the Massachusetts State Plumbing Code does require the use of water-efficient fixtures and water-conserving devices in new construction. Leaks in existing water pipes uncovered during construction normally would be repaired. In addition, the BWSC maintains an extensive leak-detection program as a major component in its water conservation program.

7. As stated in the Draft EIR/EIS, a Supplemental Impact Report/Statement will be issued on Phase II of the North Station project and will examine in detail the effects of building an artificial island in the river (should this concept ultimately be pursued). It should be noted that this procedure is in accordance with the designation of this project by the Massachusetts Secretary of Environmental Affairs as a "major and completed project" pursuant to M.G.L., Chapter 30, Section 62A and the requirement that a Final EIR be submitted on Phase II of the project prior to proceeding with this phase.

8. The commentator does not identify the alleged letter from DEQE to MEPA and the BRA is not aware of any such letter (unless the commentator is referring to DEQE's comments on the earlier Interim EIR). DEQE's own comments on the Draft EIR/EIS (see supra.) do not indicate that the area will be out of compliance with CO standards for the foreseeable future. Moreover, DEQE's own analysis of the area (Leverett Circle) for the SIP indicates compliance by 1987, thus contradicting the unidentified DEQE letter.

9. Specific mitigation measures with respect to hydrocarbon emissions from the project are outlined in Response #1 to the comments of the Massachusetts Department of Environmental Quality Engineering (see supra.).

The Commonwealth of Massachusetts
Aeronautics Commission
Boston - Logan Airport, Boston 0212

(617) 727-5350

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OFFICE OF THE S
ENVIRONMENTA

August 9, 1982

CORRECTED COPY (9/10/82)
ORIGINAL LETTER DELIVERED 9/9/82

Mr. John Bewick, Secretary
Executive Office of Environmental Affairs
100 Cambridge St., Room 2000
Boston, MA 02202

Attn: MEPA UNIT
Re: EOEA #3728
North Station Urban Renewal

Dear Secretary Bewick:

The North Station Urban renewal Draft EIR/EIS totally ignores the fact that a vitally important transportation facility exists with the Downtown Boston Heliport that is located next to the Charles River, opposite the present DPW building at 100 Nashua Street.

The heliport is the only one in the downtown Boston area and is heavily used by many high technology Massachusetts industries, such as Digital Equipment Corporation and General Electric, in the course of their everyday business.

Of greater importance is its close proximity to area hospitals. Following the Holbrook explosion and fire last year, many badly burned victims were transported to the Massachusetts General Hospital by helicopters that landed at this heliport. We subsequently learned that the existence of the heliport saved the lives of many who were badly burned and in urgent need of medical attention.

For several days following the February 1978 blizzard, the heliport was the only available air transportation facility in Eastern Massachusetts. It became a logistical center from which key government personnel operated in a coordinated attempt to direct, from the air, the recovery of the Massachusetts roadway system and performed numerous rescues throughout the period when ground transportation was at a standstill.

The Draft EIR/EIS fails to address the project's impact on air transportation as both the preferred and the potional development alternatives would eliminate the Downtown Boston Heliport.

Since the project covered by this Draft EIR/EIS requires securing a new downtown heliport site, the environmental impacts of doing so are inherent on the proposal and must be addressed in the EIR/EIS.

It is, therefore, the position of the Massachusetts Aeronautics Commission that the Draft is inadequate for failing to consider impact on air transportation and for failing to assess the environmental impact of a new site for Boston's downtown heliport.

Sincerely,

Arnold R. Stymest
Director of Aeronautics

AS:jd

cc: EOTC
MDPW
NEHPA
MVM
HAI
DEC
BRA

Mygatt

THE COMMONWEALTH OF MASSACHUSETTS
MILITARY DIVISION
THE ADJUTANT GENERAL'S OFFICE
905 COMMONWEALTH AVENUE, BOSTON, MASS. 02215

In reply refer to

MAAR-AG

18 August 1982

RECEIVED
AUG 25 1982
OFFICE OF THE SECRETARY
OF ENVIRONMENTAL AFFAIRS

Mr. John Bewick, Secretary
Executive Office of Environmental Affairs
100 Cambridge St., Room 2000
Boston, Massachusetts 02202

Dear Secretary Bewick:

I am in receipt of a copy of a letter dated 9 August 1982, sent to you by Mr. Arnold R. Stymest, Director of Aeronautics, Massachusetts Aeronautics Commission, relative to the North Station Urban renewal Draft EIR/EIS and its impact on the Downtown Boston Heliport near the present DPW building at 100 Nashua Street.

The loss of this heliport and a construction of a new heliport at some other, yet undetermined, site has a major impact on the day-to-day operations of the Massachusetts National Guard as well as its emergency operations and its support of public events such as the Pope's visit, the Queen Visit and the Tall Ships spectacle.

I might point out that the current heliport is frequently used by the Governor, members of his staff, and other members of the Executive departments either using the State Police helicopter or helicopters belonging to the Massachusetts National Guard.

I request that this office be consulted during the process of selecting an alternative site for a new heliport so as to insure it has the capability of accepting the types of helicopter we possess.

Sincerely yours,

VAHAN VARTANIAN
Major General(MA)
The Adjutant General

CF:
Mr. George Tully, EOPS
Mr. Arnold Stymest, Aero Comm
Dir of Avn

Mygatt

The Commonwealth of Massachusetts
Executive Office of Public Safety
One Ashburton Place
Boston, Massachusetts 02108

EDWARD J. KING
Governor

GEORGE A. LUCIANO
Secretary

RECEIVED
AUG 30 1982
OFFICE OF THE SECRETARY OF
ENVIRONMENTAL AFFAIRS

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OFFICE OF THE SECRETA
OF ENVIRONMENTAL AFFA

August 26, 1982

Secretary John A. Bewick
Executive Office for Environmental
Affairs
100 Cambridge Street, Room 2000
Boston, Massachusetts 02202

Dear Secretary Bewick:

Review of Mr. Arnold Stymest's letter of August 9, 1982 regarding the North Station Urban Renewal and the Nashua Street Heliport compels me to advise you of our public safety position on this matter.

As both Mr. Stymest and Adjutant General Vartanian point out, that heliport with its proximity to government center, the hospitals, etc., is invaluable not only during emergencies requiring its use, but in day-to-day operations of many state and private agencies.

We agree that the Draft EIR/EIS is inadequate in respect to the lack of heliport consideration and request that the Executive Office of Public Safety be a participant in future reviews and deliberations on that subject.

Sincerely,

George A. Luciano

George A. Luciano
Secretary of Public Safety

GAL/mrw

Mygat

digital

RECEIVED

AUG 24 1982

OFFICE OF THE SECRETARY
OF ENVIRONMENTAL AFFAIRS

20 August 1982

Mr. John Bewick, Secretary
Executive Office of Environmental Affairs
100 Cambridge St. Room 2000
Boston, MA 02202

Dear Secretary Bewick:

As Chief Helicopter Pilot for Digital Equipment Corp., I am writing this letter supporting the Downtown Boston Heliport. Digital, as you know, makes heavy use of the present Nashua Street heliport on a daily basis. It is critical that a downtown heliport remain in operation, not only for Digital, but for all corporations and concerns needing access to downtown Boston.

Mr. Arnold Stymest, Director of Aeronautics in the Commonwealth, sent me a copy of the letter he wrote to you regarding the North Station Urban Renewal Draft EIR/EIS. I must emphasize the necessity of maintaining a heliport in Downtown Boston and encourage you to address this issue in the EIR/EIS.

If I can be of any assistance in this matter, please feel free to contact me.

Sincerely,

Tom Chestnut

Tom Chestnut
Chief Helicopter Pilot

TC/sh

DIGITAL EQUIPMENT CORPORATION, AVIATION SVCS., BLDG. 1730, HANSCOM FIELD, BEDFORD, MA 01730
(617) 274 - 6693

Responses to Comments from

MASSACHUSETTS AERONAUTICS COMMISSION/ADJUTANT GENERAL'S OFFICE/EXECUTIVE OFFICE OF PUBLIC SAFETY/DIGITAL

The BRA acknowledges the critical importance of the downtown heliport, particularly for medical emergency, special events, and similar occurences. Although the heliport site was not specifically included in the Phase II redevelopment proposal of Safdie, the Authority does feel that the heliport could be accommodated within the project area, either at or near its present location (an option which, however, would adversely affect the parkland/recreation proposals espoused by the MDC and the Charles River Watershed Association (q. v.) as well as the DPW bridge options for the relocation of the Storrow Drive Connector ramps) or at another site such as the rooftop above the Lomasney Way parking structure. A specific site ultimately would depend on the final plan developed for the Phase II area, which, as noted elsewhere, may be considerably revised from the Safdie island/canal concept.

In its process of planning for and selecting a site, the Authority will consult with and seek the advise of the Aeronautics Commission and other concerned agencies, such as the Adjutant's General's Office and the Executive Office of Public Safety, which similarly are concerned with the retention of a heliport facility. (In fact, the City of Boston currently is investigating the feasibility of alternative sites in the downtown area for the heliport, in cooperation with the Aeronautics Commission.) Should an alternative site be selected, the environmental impacts of the relocation would be addressed, as appropriate, in the Phase II Supplemental EIR/EIS.

BOSTON GARDEN
NEW ENGLAND'S HUB OF SPORTS & ENTERTAINMENT SINCE 1928

August 9, 1982

Mr. John Bewick, Secretary
Executive of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Attention: MEPA Unit, File No. 03728

Mr. Richard B. Mertens
Environmental Review Officer
Boston Redevelopment Authority
Boston City Hall
One City Hall Square
Boston, MA 02201

Re: Comments - Draft Environmental Impact Report/
Draft Environmental Impact Statement
North Station Urban Renewal Project
Boston, MA

Gentlemen:

This letter is the response of New Boston Garden Corporation to the North Station Urban Renewal Project Draft EIR/EIS. New Boston Garden Corporation is the owner of the Boston Garden-North Station Terminal Building, which is slated for acquisition and demolition according to the Draft EIR/EIS. We, our tenants and the owners and tenants of the adjacent Analex Building will be most seriously affected by the proposals of the current urban renewal plan.

After a comprehensive review of the Draft EIR/EIS, we are both shocked and concerned with many of the plan's components, with the unapproved major revisions of the plan since its approval on January 19, 1981, and with the analysis of many of the impacts which apparently have been used to justify this version of the North Station Urban Renewal Project. We have examined the Draft EIR/EIS as a property owner, landlord, member of the local business community, and taxpayer. From each perspective we have found the plan to be deficient. Our concerns are both immediate and long term.

IMMEDIATE CONCERNS AND DEFICIENCIES

1. Green Line Modifications and Alternative Relocation Alignments

We agree that the demolition of the existing Green Line elevated structure is of paramount importance for the successful renewal of the North Station area.

However, any proposed new alignment which would necessitate the demolition of the Boston Garden Complex is categorically unacceptable. Moreover, in face of a 50-year history of urban renewal efforts in this country to eliminate elevated mass transit lines, we find it bizarre to see that the present plan calls for multi-million dollar demolition of one elevated line only to rebuild another elevated line a short distance away. There are surely better alternatives. ①

2. Proposed Alternatives for a New Arena

As a taxpayer and building owner we were shocked to read of the two alternatives for a publicly financed new arena. One alternative does not meet contemporary arena design standards -- indeed, according to the report, it does not meet current arena requirements of either the National Hockey League or the National Basketball Association. The other alternative requires the Boston Garden to be demolished before the new arena can be completed. The former alternative calls for massive expenditure, and economic dislocation, in order to build at best a second rate facility. The latter calls for a course of construction which will certainly drive the principal arena users out of town for the short run and probably permanently. Boston may then have a "modern" arena; but it is likely to be empty and underutilized, an experience shared by many similar showcase arenas around the country. ②

The current projected cost is $77,830,000 for the arena and attendant parking. Recent experience throughout the country has consistently and conclusively demonstrated that projected arena and stadium costs significantly escalate by the time of ultimate construction. In addition, experience has shown that publicly financed arenas, particularly with their huge debt service burdens, but even on a current operating basis alone, consistently run as deficit operations. The economic risks and burdens of the proposal, consequently, have been either overlooked or greatly understated.

If the new arena should be developed, the huge projected capital cost and operating burden is a stiff penalty for the taxpayers of the Commonwealth to pay for 500± more seats than a privately financed rehabilitated Boston Garden could provide.

for the proposed new arena. In addition, the capital investment would be private rather than public.

Taking and demolition of the North Station/Boston Garden will have, in addition, severe economic impacts that will tend to defeat the objectives of the urban renewal project. First, it will make very likely that either one or both of Boston's major indoor sports teams will relocate outside the City and that they will draw with them other entertainment ⑥ users of the arena facility as well. In light of recent experience throughout the country, this prospect should not be underestimated. Second, it would cause the decline or failure of many businesses in the North End and Bullfinch Triangle area which depend, and have depended for years, upon Boston Garden patrons. Third, it will disrupt and may displace tenant businesses in both the North Station/Boston Garden and 150 Causeway Street.

The current proposal also fails to give adequate consideration to the distinctive architectural and historic value of the North Station/Boston Garden. Indeed, we believe that the North Station/Boston Garden complex has the necessary historic, architectural, and cultural merit to be included on the National Register of Historic Places. The building was designed as one of the premier railroad terminals of its day; it is one ⑦ of the few remaining examples of Art Decco architecture in Boston; and it is visited each year by hundreds if not thousands of persons interested in its architectural and historic significance. On the urban landscape, this type of monument should not be hastily destroyed.

LONG TERM CONCERNS

We believe that the proposed demolition of the North Station/Boston Garden and construction of a new arena represents a profound flaw affecting the long-term success of the North Station Urban Renewal Project. The success of this project, like the success of any mixed-use urban renewal project, depends to a great extent upon private support and speedy implementation. The present plan, however, discourages both. Instead of early, enthusiastic support by private investment, such as a plan calling for rehabilitation of the North Station/Boston Garden would evoke, the present plan drives private investment out. There will be no early private ⑧ investment leadership such as New Boston Garden Corporation could provide. Moreover, the present plan, because of its deficiencies, is certain to generate strenuous opposition, legal and otherwise, from affected private interests both within, and in the immediate vicinity of, the project area. Such opposition will delay and may defeat implementation of the plan.

The plan, we fear, is reminiscent of the philosophy of urban renewal of the early 1950s -- the philosophy of the bulldozer. Everything within the project area, in particular the only substantial existing private enterprise, is to be swept away.

The decision to include this publicly financed component in the plan apparently was made after the Ad Hoc Arena Committee came to the conclusion "that no financially feasible amount of renovation could overcome the Garden's architectural con- ③ straints and provide an acceptable number of unobstructed-view seats." It is difficult to see how this conclusion was reached since at no time did the committee ever review New Boston Garden Corporation's studies and drawings of proposed Boston Garden rehabilitation in order to determine the accuracy of the conclusion. Had the committee done so, its conclusion would have been different.

The validity of the EIR/EIS, in fact, must be called into question because it does not even discuss the privately financed rehabilitation alternative. Further, the EIR/EIS does not adequately forecast the duration and the severity of either the short term or the long term impacts on many of ④ the area's existing businesses, functions and patrons. Indeed, it is questionable whether or not the current plan may be lawfully implemented since the change of the approved plan is major and significant and since the requisite procedures for adoption and approval of the change have not been taken.

3. Acquisition and Demolition of the North Station/Boston Garden

The component of the Plan which came as the greatest shock was the elimination of the North Station/Boston Garden, since rehabilitation of the present facility was one of the cornerstones of the Urban Renewal Plan approved in 1981. The approved Plan not only contemplated the privately financed rehabilitation of the existing complex but also provided for the sale of Parcel 2A to the New Boston Garden Corporation so that we could construct a northern wing to the building which would provide mechanical vertical circulation including escalators and elevators, egress stairways, new restrooms for men, women, and handicapped, contemporary concession facilities, and circulation space.

It was in fact based on the approved Plan that New Boston Garden Corporation has already commissioned comprehensive ⑤ studies, at an expense in excess of $500,000, relating to the rehabilitation and addition to the North Station/Boston Garden complex. These studies have been executed by Sink/Combs and Associates of Denver, Colorado, John Carl Warnecke and Associates of Boston, Sverdrup and Parcel and Associates, Inc. of St. Louis, Missouri, and Design-Science International, Inc. of Boston. As an indication of its commitment to rehabilitation of the present facility, New Boston Garden Corporation is currently installing a new roof and a new boiler plant at costs in excess of $1.3 million.

These studies demonstrate that the Boston Garden can be renovated into a first class arena, as prescribed in the 1981 North Station Plan, for a fraction of the dollars required

Then, from the barren field, public authorities alone will attempt to build and, ironically, to seek to re-introduce the private enterprise recently driven out. This is a formula for delay, enormous public expense and dominance of public over private development. It is a formula which will produce conflict rather than cooperation between the private and public sectors. It is a formula which should be reconsidered and altered.

Sincerely yours,

Paul A. Mooney
President

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[illegible] OF THE [illegible]
[illegible] ENVIRONMENTAL [illegible]

ATTACHMENT

NORTH STATION - BOSTON GARDEN REHABILITATION

The New Boston Garden Corporation's plans for the revitalization of the North Station and Boston Garden are comprehensive. It's goal is to create a first class contemporary arena which is accessible to all including the elderly and handicapped; to restore and enhance the building's exterior which has been claimed by architectural historians as a fine example of the Art Deco style; and to create a functional and attractive retail/transportation complex on the first floor and mezzanine of the North Station/Boston Garden.

To achieve this goal the New Boston Garden Corporation has commissioned plans for an addition which will be located adjacent to the northern facade of the Garden on the the parcel designated as 2A in the Urban Renewal Plan approved on January 19, 1981. This addition will provide mechanical circulation to every level of the building. (Today these levels can only be reached by walking other than by one small elevator). This wing will also include new bathrooms for men, women, and the handicapped. It will provide contemporary concession stands and appropriate circulation space. It will also include new interior egress stairs replacing existing exterior fire escapes.

A second component includes the installation of a new heating plant (currently under construction); the introduction of air conditioning which will extend the full time operations of the Garden to four seasons of the year (Today, the Garden only operates on a full time basis from October 1 to May 1); the replacement of antiquated electrical and plumbi systems; the restructuring of the seating to provide better sight lines and accessibility; and the addition of private boxes at the upper level of the arena.

A third component relates to the exterior rehabilitation of the building including the replacement of the existing roof (currently under construction); tuck pointing of the walls (currently under way); the refurbishing of the west wall which will be barren once the Madison Hotel is demolished to make way for the new GSA building, and the removal of the exterior fire escapes.

The last component involves the rehabilitation of the first floor and mezzanine in such a way to vastly improve pedestrian circulation and current conflict between MBTA commuters and Garden patrons; and to create an attractive environment for the mixture of uses housed in this complex.

To make this privately financed project economically viable the New Boston Garden Corporation is seeking a 121 A designation from the Boston Redevelopment Authority. Upon receipt of this designation the owners are willing to proceed with the proposed rehabilitation and new construction at a cost of some $12,000,000 to $15,000,000.

COMPARATIVE ANALYSIS OF BOSTON GARDEN REHABILITATION AND NEW ARENA CONSTRUCTION

Although the EIR/EIS stated that there were two arena alternatives currently being considered, one which measured 295 feet by 410 feet and the other which measured 400 feet by 400 feet there appears to be little documentation relating to the second alternative except that it would be constructed in two phases and require the demolition of the Garden prior to completion of it's construction. The first alternative is more completely described in the "Arena Committee Final Recommendations" published in August 1981. The major difference between ⑨ the information contained in the Arena Report of August 1981 and the EIR/EIS of July 1982 is that either the cost of the Arena escalated $21,000,000 or the authors decided to include the cost of the garage which would equal $42,000 a parking space or approximately three times the projected cost of the Lafayette Place Parking Garage.

SUMMARY COMPARISON

	Boston Garden	New Arena
Uses	Arena, transportation Center, Retail and Restaurant complex	Arena and parking, and an MBTA station
Ground Floor Area	240' x 430'	295' x 410'
Total Area	397,000 sq. ft.	350,000 sq. ft. plus parking
Estimated Project Cost-'82	$12,000,000-15,000,000	$77,830,000
Financing	Private	Public
Seating	15,511 seats	16,000 seats
Design and Construction-Time	2.5 - 3.0 years	?
Downtime	0.0 years	0.0 years
Premium Costs	$0	$7,210,000
Land and Acquisition	$800,000*	$9,000,000**
Public Improvements	$0	$1,000,000

* by interpolation

** This figure is unrealistically low as it does not adequately cover the fair acquisition cost of the Boston Garden complex.

Responses to Comments from

BOSTON GARDEN

1. The proposed new alignment for a relocated Green Line elevated structure does not necessitate the demolition of the Boston Garden complex, since the right-of-way would occur on air rights over an existing roadway (Accolon Way) and a City of Boston parking lot adjacent to the Storrow Drive Connector ramps. Hence the relocation could be accomplished while the Garden remained in place (in fact, the MBTA's time schedule anticipates construction of the relocated elevated prior to demolition of the Boston Garden complex). However, existing elevated connections between the Garden and the Analex Building would have to be removed and substitute connections provided, and existing fire escapes along the easterly side of the Boston Garden building and utility connections between the buildings also may be affected. For a detailed discussion of alternatives to a relocated elevated, see the Urban Mass Transportation Administration's Boston Green Line Improvements at North Station Draft Environmental Impact Statement (August 1982), which was prepared in conjunction with the BRA's North Station Urban Renewal project, or the Massachusetts Bay Transportation Authority's Green Line North Station Relocation Evaluation Report (August 1982).

2. The *ad hoc* Arena Committee proposed two different building configurations, both of which would provide Boston with a first rate, multi-purpose arena. The North Station DEIR/EIS does not, as claimed by Mr. Mooney's letter, state that one of the proposed configurations fails to meet National Hockey League and National Basketball Association requirements. What it does say, rather, is that one of the proposed arena configurations is somewhat narrower than many arenas built in recent years in other cities. Most recently built arenas are wide because they do not have balconies and to reach desired capacities the buildings must be made wider. One negative result of this model, however, is that it locates many fans a substantial distance away from the arena floor. The objective of the Arena Committee in proposing a narrower configuration which includes a single balcony was to "double the number of good, unobstructed new seats without sacrificing the intimacy and excitement of the present Garden whose spectators are much closer to the action than they are in many arenas around the country" (Final Recommendation, The Arena Committee, August, 1981, p.7). It is worth noting, too, that both configurations can be implemented without causing a temporary dislocation of the present principal users of the Boston Garden.

   While the New Boston Garden Corporation letter pointed out that publicly financed arenas usually operate at a deficit, the record shows that new arenas in general usually operate at a deficit. As a result, most new arenas built in recent years have been built by the public sector. It is the public sector which has assumed the risks that are inherent in developing an arena when the private sector has failed to. In other cities the risk-taking has been justified on the basis of producing substantial public benefits. At the same time the public sector is better able to reap the large economic benefits attendant to the operation of an arena in the form of a variety of tax revenues which are not available to a private arena developer, so that on a financial basis alone the arena can be a sound investment for the public sector.

One of the objectives of the Committee is an arena which increases the ratio of first quality unobstructed-view seats while not substantially increasing the total capacity of a new arena from that of the existing Garden. The new arena plans should be evaluated in general and compared specifically to the Boston Garden on the basis of this criterion and not on whether it provides a capacity which is excessive for the Boston market.

3. The Arena Committee undertook its work with the assistance of professionals in the fields of architecture, law, business, engineering, finance, and real estate. Substantial amounts of information were gathered and produced to assist the Committee. Conclusions reached by the Committee were based on the best documentation that could be obtained and the capable advise of competent professionals and reflects the substantial breadth and depth of experience found among the members of the Committee. Any document with regard to the Boston Garden which the Committee may not have examined was the result of a lack of cooperation on the part of the New Boston Garden Corporation and not a lack of desire to examine such documents on the part of the Committee. The Committee concluded that the shortcomings of the Boston Garden were so fundamental that it was not financially sound to correct them.

4. The rehabilitation alternative for the Boston Garden was discussed in the Interim EIR, published on August 29, 1980. As a result of the subsequent Arena Committee report, this alternative was dropped from further consideration in the Draft EIR/EIS (see pg. IV-1). It should be noted, however, that the No-Build alternative did assume a major renovation by 1985 (pg. IV-2).

   In the long-term, the impacts of renovating the existing building and of building a new arena would be, in most respects, essentially the same, since the use would remain similar in both cases and the capacity of the new arena would be only slightly greater than the existing Garden. In the short-term, there would be only temporary, primarily construction-related, impacts on the area's existing businesses, functions, and patrons with the new Arena option; no relocation would be required since the existing Boston Garden could remain in operation until the new Arena was completed. Rehabilitation of the existing Garden, on the other hand, would necessitate a temporary relocation of businesses in the facility as well as the dislocation of one or both of the City's major indoor sports teams (or a short-term loss of a significant number of seats) in order to complete the substantial renovation required.

   It is recognized that the current plan does represent a change from the approved Urban Renewal Plan. Should the BRA, following further study of the Garden replacement proposal and a positive recommendation resulting from a feasibility study by the Massachusetts Convention Center

Authority pursuant to Section 38E of Chapter 190 of the Acts of 1982, decide to amend the Plan officially, appropriate procedures pursuant to Section 2.3.8.1 of the Urban Renewal Plan (Modification of the Urban Renewal Plan) will be followed.

5. The North Station Urban Renewal Plan as originally formulated proposed that the North Station/Boston Garden be rehabilitated. Before the plan was even approved by the State, however, the owner of the Boston Garden proposed building a new arena in New Hampshire and moving the Bruins there as well. It was this proposal which stimulated the formation of the Arena Committee which recommended that a new arena be constructed at North Station. It is surprising to learn that the New Boston Garden Corporation was spending $500,000 for rehabilitation plans for the Boston Garden at the same time its parent organization was pursuing development of a new arena in New Hampshire. Since the apparent demise of the New Hampshire proposal, the Authority has not been contacted by the New Boston Garden Corporation to clarify their present intentions.

6. Since no temporary relocation of either existing businesses in the North Station/Boston Garden complex or of the sports teams using the facility would be required in order to construct a new arena (demolition of the existing Garden only would occur following completion of the new Arena), severe economic impacts on these parties or on businesses in the North End and Bulfinch Triangle area should not be expected to result. Rather, a new facility should help attract more patrons, thus benefiting many of the area's businesses. Demolition of the Garden building should have only minimal, if any, impact on tenant businesses at 150 Causeway Street and would not require their displacement.

   With regard to possible dislocation of the City's major indoor sports teams because of the new Arena proposals, it was noted in Response #5 above that it was the parent organization of the Boston Garden itself that was proposing to move the Bruins hockey team to a new facility in New Hampshire. Likewise, the Celtics basketball team has threatened, on several occasions, to relocate outside the City in a separate facility due to inadequacies with the present Garden and to leasing difficulties. The main objective of the new Arena proposal is to provide the type of facility that will keep these teams in Boston and will provide a satisfactory home for the professional sports and entertainment events.

7. While it is recognized that the North Station/Boston Garden complex (as well as the adjacent Madison Hotel) do exhibit some distinctive architectural elements of the Art Decco period, the building was surveyed by the Massachusetts Historical Commission (the State agency which has primary responsibility for identifying and nominating properties to the National Register) but was not identified as a significant resource eligible for National Register listing (see pg. V-11 of the DEIR/EIS and Appendix P-1). We agree that destruction of significant urban monuments should be avoided if at all possible. Nonetheless, the urban landscape is dynamic and is constantly in a state of change. In fact, the present North Station/Boston Garden building itself replaced the more architecturally imposing 1894 Union Station in 1928.

8. The BRA disagrees with the New Boston Garden Corporation's formula for success in the North Station project. For the Authority, there are three elements in the development program which are key to the success of Phase I: The Green Line elevated, the Federal Office Building, and the Arena. The Green Line elevated over Causeway Street and Lomasney Way is the dominant blighting factor which is keeping private investment from the area and must be removed. This is clearly the responsibility of the public sector. The proposed Federal Office Building was successfully sought-for for the North Station Area because it was seen as an early-on major investment to assure the private market that the area would be attractive for new investment. The Arena is important because Boston badly needs a contemporary facility and it is in mass and function an imposing component of Phase I. The Authority concurs with the Arena Committe that North Station is the best location to provide up-to-date arena facilities and that the desired facility cannot be cost-effectively developed through rehabilitation of the existing Boston Garden. After extensive review and analysis of recent arena developments in North America and of the local situation, the Committee recommended that a public entity would be the most promising method of developing a new arena in Boston. The Authority has had no arbitrarily-conceived view to drive out private investment in executing Phase I of the North Station project; rather the planned public sector role relates to the nature of the three key elements in Phase I and how each best can be effected. Rather than driving out private investment there is substantial private market planning occurring now, particularly with regard to areas contiguous to the boundaries of the project.

9. As clearly stated on pg. III-27 of the DEIR/EIS, the Arena's cost of an estimated $77,830,000 represents total expenditures "from a newly-created Arena Committee to fund the construction of a new sports arena and associated parking facilities" (emphasis added). Total costs for the Arena alone are estimated at $56,830,000 (The Arena Committee, Final Recommendations, August 1981, p. 29). The additional $21,000,000 represents the costs of constructing 1,500 garaged parking spaces (500 beneath the Arena and 1,000 in a separate structure behind the Federal Office Building), which would equal $14,000 per space, a cost comparable with similar garages. The construction of these parking spaces by the Arena Commission is a specific recommendation of the Committee (pp. 12, 18 of the Final Recommendation); thus the inclusion of these costs in the total funding to be obtained from the Arena Committee.

AUG 10 1982

Charles River Watershed Association

August 9, 1982

Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Attention: MEPA Unit EOEA #03728

Dear Sir,

The Charles River Watershed Association acknowledges that the purpose of the draft Environmental Impact Report is to receive comment on the adequacy of impact assessment, separate from CRWA's position on the renewal project per se. Our comments are therefore limited to the impacts whose assessment was requested by the Secretary's decision and to those issues germane to CRWA's Purpose and Aims.

Our response to the dEIR is dictated by our long support for and involvement in the creation of the Charles River Corridor, a state-proposed program to protect the recovering Charles River from redegradation by managing its banks and to provide maximum public access to the Charles River and its shores. This is consistent with the public's financial investment in the clean-up of the Charles.

The dEIR is characterized by inadequate attention to the view of the extended Charles River Basin from the renewal project buildings and a total lack of assessment of the view of the buildings from the river. The dEIR states in summary "Since no public open space or recreational areas presently exist in the project area, neither redevelopment proposal would affect any of these resources". (VII-1) What in the world does the Boston Redevelopment Authority consider the Charles River Basin?? ①

CRWA could endorse the redevelopment of the shoreline of the lower Charles to enhance the river environment as water quality improves. II-3 identifies improved water quality in the Basin as one of the "major benefits, costs, and environmental impacts" of the proposed project - in point of fact the water quality is improving quite apart from any proposed area redevelopment and is likely to make the latter attractive to consider. ②

CRWA opposes the construction of a canal and island which would narrow the Basin openness, reduce its potential for quality recreation for the urban populace, and create another pre-emptive enclave for the privileged. The comparison with the Ile St. Louis in the Seine is completely inappropriate. Ile St. Louis is a natural island in the Seine which was developed in the 17th century to accommodate a growing city. The Isle de Safdie serves no useful public purpose and intrudes on a precious open space needed in an already-developed city. The suggestion tossed out in the dEIR that an "important public building or museum" would grace the island is worthless in terms of evaluating potential impacts. ③

Should an island be assured - and CRWA does not accept the island - a review of the plan in the dEIR shows that it is too large, that it overwhelms the Basin. It is so close to the Gridley Locks that a commercial operator would need articulated barges to navigate the restricted area between the locks and the island edge. The Isle de Safdie is unacceptably angular and harsh, with no acknowledgement of a river's tendency to curve; the proposed design is jarring. ④

There is an inconsistency among statements made throughout the dEIR. The comment cited above (no open space in the area) is contradicted on VI-7: "the North Station area....breaks the Charles River open space system in half". This alludes obviously to the land on the river bank but we submit that the river is an open space that would be broken by the island. VI-164 describes the island's "park-like setting" from the shore perspective, yet the Report proposes a complex of 150'-high buildings to house variously "over 1000" or "1500" residential units (depending on which page is read). The BRA appears uncertain what values to assign to the Charles River Basin. ⑤

VI-6 expresses concern that users of a new hotel, except those at the highest levels, would be adversely affected by noise from and views of the proposed highway ramps. Similar concern should be afforded the users of the Charles River Basin. ⑥

Comparisons of the proposed island with the Storrow Lagoon and Esplanade islands are specious. The latter are open landscapes, the former packed with high-rise buildings. ⑦

CRWA opposes continued pre-emption of the immediate banks of the Charles River for non-river-dependent purposes. Therefore our preferred alternative would be to confine North Station Area renewal to the existing land, with a deep extension of the Esplanade and a setback of commercial and residential development. The canyonizing of the water front with luxury development to which the Harbor has been subjected must not be repeated in the new Basin on the Charles. ⑧

While the issue of housing is not germane to CRWA's Purpose and Aims, it would be regrettable to displace present low- and moderate-income residents, many of whom are admittedly once removed from their former West End homes, and to thus increase the number of residents the report describes as "better related to the Charles River Park complex, with which it would have a similar socio-economic character". It is the general public whose taxes have been paying for river improvements and a return on that investment should be guaranteed. Displacement gives no such guarantee. ⑨

One of the alternative proposals would retain the Registry of Motor Vehicles building and the Massachusetts Rehabilitation Hospital. However, a further discussion of retaining the latter refers to dedicating the island solely to the hospital and a park. Another option cited would be to demolish and relocate the hospital - does that relocation imply the island as a new site? It is not clear. We recognize that these decisions are for Phase II but as we requested in our April 1980 response to the Environmental Notification Form Phase II cannot safely be separated from Phase I for comprehensive planning to work. ⑩

Improved water quality will derive from the Charles River Dam, the Prison Point Facility, destratification of the Basins, correction of combined sewer overflows, and tide-gate repair/replacement. These publicly-funded projects comprise the incentive for enhancement of the new Basin as a quality recreational resource. Community Boating has long been at capacity and a similar facility in the new [illegible] should be developed for general public use. Tour and excursion [illegible] are awaiting improvements in water quality to permit residents and visitors to enjoy the Charles River's last reach. Fishing will improve in due course as the lower Charles begins to reach its Class C goal. This urban resource is a critical one envied across the country and CRWA believes that it is underestimated in the dEIR and in the project per se. ⑪

Some further comments/questions follow:

Construction of any element of the renewal project must safeguard the anadromous fish, most particularly the returning shad which are most sensitive to their environment. This is especially critical during their upstream passage. ⑫

What effect could pile driving expect to have on the stability of the Charles River Dam? ⑬

The premature addition of up to 850,000 gpd of sewage to Deer Island is unthinkable given the existing problems at the plant which are not expected to be corrected for some time. The impact of this additional sewage load on Boston Harbor should be carefully assessed. ⑭

V-62 paragraph 2 should be corrected to read "to maintain a destratified aquatic environment...." ⑮

Finally, our early question also asked by MEPA in the EIR Scope remains unanswered as far as we can determine. According to the dEIR, 15% of the project area is water, clearly placing that 15% outside of the BRA jurisdiction. Why is the City of Boston making such ambitious plans for the MDC's jurisdiction? ⑯

In April 1980 CRWA reviewed and commented on the Environmental Notification Form for the subject project. We also met with BRA staff for a discussion of the project. At that time we asked and were promised to be advised by BRA when/if the project began to move, since it was described to us at that time as being on indefinite hold. Our review of the dEIR would have been helped immeasurably has that promise been kept. It raises questions about the BRA's willingness to be influenced by those whose prior interests are affected by its project proposals. We trust that our concerns for the Charles River will be addressed in this instance. ⑰

Sincerely,

Rita Barron
Executive Director

Responses to Comments from

CHARLES RIVER WATERSHED ASSOCIATION

1. The reference to "public open space or recreational areas" on page VII-1 of the DEIR/EIS was limited to parkland and other land-based recreational facilities. It is recognized that the Charles River Basin also in an open space; but within the North Station project area, because of the current degraded quality of the water and the lack of public access to its banks, the recreational use of the Basin is limited almost solely to the passage of pleasure boats between the upper basin and the Boston Harbor (as was indicated on pages V-20, V-39, and VI-10 of the DEIR/EIS. With continued improvement both in water quality and the adjacent shoreline, the recreational potential of this portion of the Basin should be heightened.

   Obviously, the view of the extended Charles River Basin from the renewal project's buildings would be dramatic. At the same time, replacement of the unkempt shoreline and the unsightly vast expanses of parking lots and railyards adjacent to the river (see, for example, Figures V-27 and V-31 of this FEIR/EIS) by the proposed structures could create an equally dramatic urban amenity. A detailed discussion of the visual aspects of the proposed project was presented in Section K.2 of Part VI of the DEIR/EIS.

2. The Draft EIR/EIS (pg. VII-9 and elsewhere) did acknowledge that improvements in the water quality of the Charles River Basin are occurring independent of the proposed area redevelopment.

3. The proposed construction of a canal and island in Sub-Area II of the renewal project area is primarily conceptual at this time. As stated on page III-20 of the DEIR/EIS, more definitive proposals for this section of the project will be developed through extensive planning and design studies to be carried out over the next several years. Such studies, as well as detailed cost and environmental analyses, may, in fact, result in a substantially revised development scheme which would not include the island proposal.

   Secondly, although the island would intrude partially into the present river area, most of the "island" actually would be built on existing land area and railroad property, and the canal also would be constructed within the present land area (see Figure VIII-2). According to BRA studies, the total water area would, in fact, increase from 7.2 acres to 8.8 acres under this scheme.

4. As noted in the previous response, most of the island actually is constructed on the existing land mass and only a small portion intrudes upon the river area. In this section of the Basin, the water area already is constrained by the railroad bridges and rights-of-way, and while the island, depending on final design, could further constrain this area, new water area would be added by the canal construction. Admittedly, under the present conceptual design, the closeness of the easternmost portion of the proposed island to the Gridley Locks could hamper the passage of barges through these locks. However, as stated on page VI-10 of the DEIR/EIS, further planning for the island concept would

NORTH STATION
REDEVELOPMENT
PROJECT

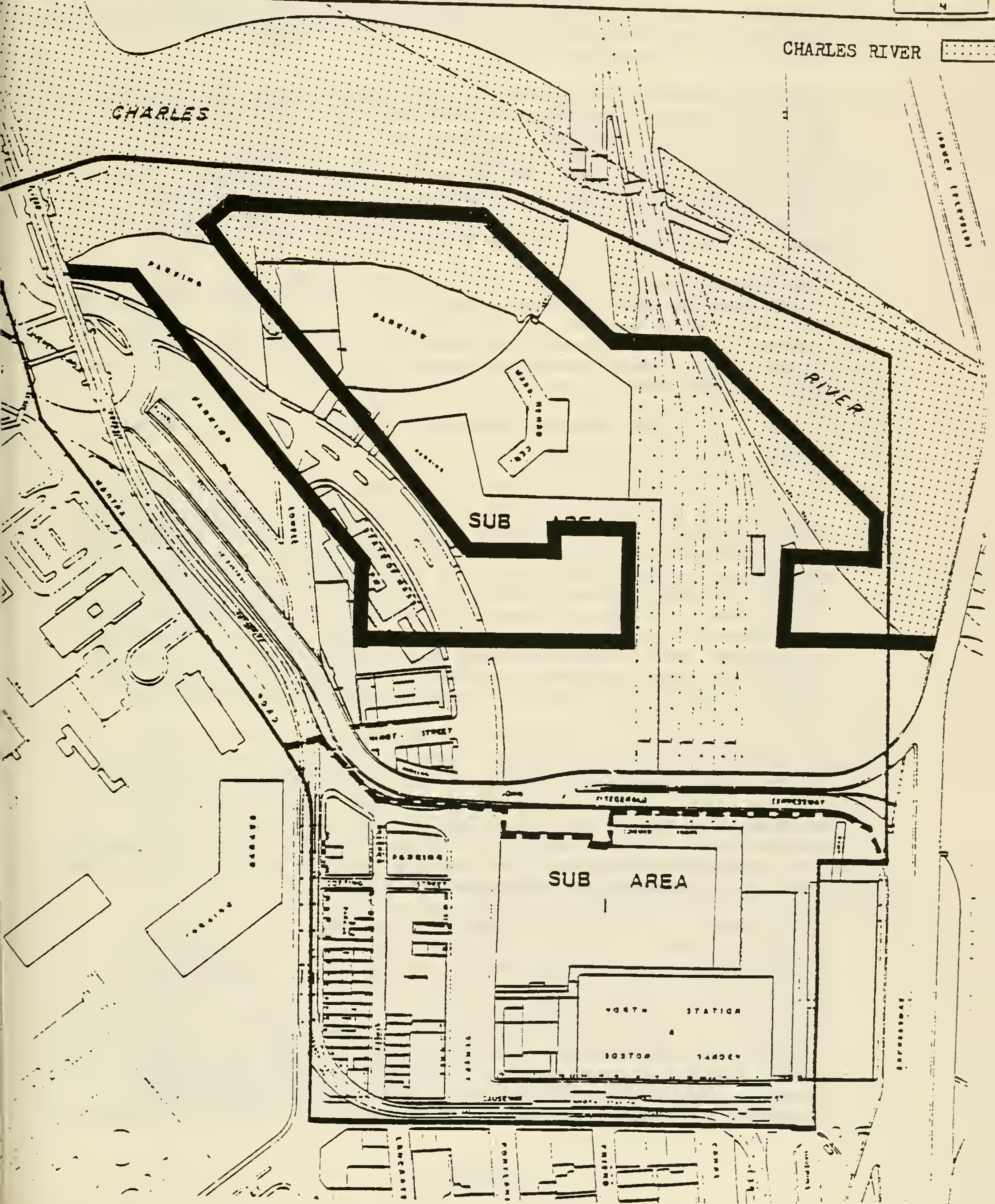
BOSTON REDEVELOPMENT AUTHORITY

PROPOSED ISLAND/CANAL
LOCATION SUPERIMPOSED
ON EXISTING PROJECT SITE

0 200 400 FT
0 50 100 M

Figure VIII-2

N



take into account the need for an adequate navigational channel, and the impacts of the construction of the island on boat-usage of the Charles River would be examined in detail.

5. Page VI-164 clearly was referring to the optional development program, in which a smaller-scale island (almost entirely built on the existing shoreland) would be primarily an open park area, with only the Massachusetts Rehabilitation Hospital and some surface parking included, thus giving the "park-like setting from the shore perspective". The 1,100 residential units on the island (the number used consistently throughout the document) are proposed only in the preferred scheme (see also response #1 for reference to the Charles River open space).

6. The highway ramps referred to in this comment apparently are those which would be built to implement any of the DPW bridge alternatives for the relocation of the Storrow Drive Connector. These ramps would produce adverse noise and visual impacts not only on nearby buildings (such as the proposed hotel) but also on pedestrians and users of the Charles River Basin.

7. The comparison was intended to refer to concept only, not to an exact specific form or development.

8. As noted in response #3, the Phase II development is merely conceptual at this stage and is based on the proposals of the Authority's urban design consultant for the project, Moshe Safdie. A future implementation of this scheme in its present architectural form is by no means certain. Obviously, two basic concepts for the development of this portion of the City's waterfront are being put forth, both of which are valid - the very urban architectural scheme proposed by Safdie and the more open, park-like setting envisioned by the Charles River Watershed Association and others. More detailed planning and design studies, as well as the concerns of interested groups such as the Watershed Association, will need to be evaluated before any definitive plan is adopted (see also response #17 below).

   In addition, as noted previously, most of the redevelopment is confined to the existing land; only a small portion of the river would be filled in for the island. Moreover, the Esplanade park would be extended between the proposed canal and Lomasney Way in the western part of the project area, and there would be a minimum 50-foot setback of commercial and residential development from the river and the southerly edge of the canal, as recommended by the Watershed Association.

9. Displacement of the existing residents is required to accommodate construction of the new Federal Office Building, not for the proposed residential development in the Phase II area, as this comment implies. Although the proposed housing would, in general, have a population mix more similar in socio-economic character to the Charles River Park complex, a definitive housing program has not been formulated at this early stage of project planning. It is anticipated, however, that this housing would include a mixture of types, including subsidized and elderly units as well as market-rate and luxury apartments and/or condominiums. Moreover, the commentator erroneously quoted the DEIR/EIS as describing

the new "residents" as being better related to the Charles River Park development; the document (pg. VI-4) clearly referred to the "location" of the proposed housing.

10. It is not presently contemplated, under the preferred development program, to relocate the Rehabilitation Hospital to the proposed island.

    For comprehensive planning purposes, Phase II has not been separated from Phase I. However, the BRA does not believe that any successful development of Phase II can occur until the redevelopment of the Phase I sub-area is substantially underway. Hence, the concentration of the Authority's planning efforts for the North Station project has been on Phase I. The BRA does plan, in the near future, to initiate detailed planning and design studies of the Phase II area in order to establish a more definitive plan related to the overall development concept.

11. The proposed plans do not foreclose the opportunity of providing boat moorings in the project area. As noted on page VI-9 of the DEIR/EIS, the docking and launching of boats is suggested for both the preferred and the optional development programs. With improvement in the water quality of the Lower Basin and redevelopment of the adjacent shoreline, the potential for more active use of the Basin is clearly recognized. The project plan attempts to provide an attractive urban setting for the enjoyment of further recreational uses of the river.

12. Any future project construction within the river will include measures to safeguard the anadromous fish now being restored to the Charles River. In addition, compliance with the provisions of the Fish and Wildlife Coordination Act will be required prior to any alteration of the shoreline or modification of the rive channel.

13. The effect of any pile driving in the Phase II area on the stability of the Charles River Dam will be examined in the Supplemental EIR/EIS for the Phase II development.

14. Total sewerage from the project is estimated at approximately 754,000 gpd (Table VI.D-2 of the DEIR/EIS), not 850,000 gpd stated in the comment. This amount, however, would be added incrementally over a 15-20 year period, by which time it is expected that the MDC would have upgraded and expanded both the Deer Island and the Nut Island treatment facilities to handle additional flows from the metropolitan area. For an analysis of the impact of additional sewerage load on Boston Harbor, the commentator is referred to the Draft Environmental Impact Statement on the Upgrading of the Boston Metropolitan Area Sewerage System (U.S. Environmental Protection Agency, Boston, (1978)).

15. The sentence should have read ... "to maintain a satisfactory aquatic environment".

16. While the Charles River legally is not under the BRA's "jurisdiction" (being under the "care and control" of the Metropolitan District Commission), neither strictly are the several large land parcels owned by various agencies of the Commonwealth (DPW, MDC, MBTA). As the City's statutory planning and redevelopment agency, the BRA is charged

with the duties and responsibilities of general city planning and urban renewal development. Therefore, it is appropriate for the Authority to prepare comprehensive plans for the entire City of Boston, as well as for the revitalization of decadent or underutilized areas, such as the North Station district. Such planning must, of course, take into account both the short-range and the long-range plans of other public agencies. As noted on page VI-3 of the DEIR/EIS, the redevelopment proposals are generally consistent with the long-standing objectives of the MDC (yet to be fulfilled) of expanding the Esplanade parkway along this section of the Charles River Basin (albeit, to some extent, in a different form than the Charles River Watershed Association would envision).

17. In December, 1980, staff of the Boston Redevelopment Authority met with representatives of the Charles River Watershed Association to review the status of the North Station Urban Renewal Project. At the time of the meeting the Authority was waiting for State approval of the project and was evaluating the potential impact of Proposition 2½ on the availability of the City Capital funds for the project. CRWA expressed primary interest in Phase II of the project and its impact on the river basin and the treatment of the edges of the river. They were concerned about Phase I to the extent that the development of this area of the project could affect what happened, subsequently, in Phase II.

CRWA was informed that the Authority expected to receive full urban renewal approval from the State only for Phase I and that Phase II would require additional planning over a several-year period. It was furthermore stated that the implementation of Phase II was likely to be at least five years away. CRWA was told that before additional planning would be undertaken for Phase II the Authority would concentrate on completing the environmental review requirements for the project and on assembling the site for the new Federal Building, for which there was a deadline by agreement with the General Services Administration. The Authority agreed to keep the CRWA informed as the planning of Phase II made progress and if there were any changes in the project which would impact the river. To date, no substantial program changes have been made in the project and additional planning for Phase II has yet to progress to the point where discussions with individuals or groups outside of the Authority would be productive. The issuance of the Draft EIR/EIS is not a departure from what CRWA was told at the December 1980 meeting. The BRA intends to seek the advise of CRWA on the project at stages where it seems appropriate and productive for both parties, and is ready to meet with CRWA at their initiation at any time.

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TECHNICAL APPENDICES

The following Technical Appendices relating to specific aspects of the North Station Urban Renewal Project have been prepared in connection with this Environmental Impact Report/Statement. Copies of these reports are available to reviewing agencies and individuals on request. A reproduction charge may be required to cover printing costs. Copies also are available for inspection at the offices of the Environmental Review Section, Boston Redevelopment Authority, Room 948, Boston Ciy Hall.

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